

CITY OF AMERICAN CANYON



2005 URBAN WATER MANAGEMENT PLAN

FINAL

January 2006



Prepared by

WINZLER & KELLY
CONSULTING ENGINEERS

495 Tesconi Circle
Santa Rosa, CA 95403
www.w-and-k.com

TABLE OF CONTENTS

	Key Acronyms and Abbreviations Used in This Document	
ES	Executive Summary.....	ES-1
Section 1.0	Introduction to this Document.....	1-1
	1.1 Purpose.....	1-1
	1.2 Law	1-1
	1.3 Structure of Plan	1-1
	1.4 Appropriate Level of Planning	1-2
	1.5 Agency Coordination	1-2
Section 2.0	Public Participation, Adoption, and Implementation.....	2-1
	2.1 Introduction.....	2-1
	2.2 Public Scoping Meeting - April 7, 2005	2-1
	2.3 Water Supply and Water Conservation Public Meeting - July 7, 2005 ...	2-1
	2.4 Presentation of the Draft UWMP – January 5, 2006	2-2
	2.5 Consideration of Adoption of the Final UWMP – February 2, 2006	2-2
Section 3.0	Service Area.....	3-1
	3.1 Introduction.....	3-1
	3.2 Population: Current and Projected.....	3-1
	3.3 Climate.....	3-2
Section 4.0	Water Supply.....	4-1
	4.1 Introduction.....	4-1
	4.2 Current and Planned Water Supplies	4-1
	<i>State Water Project</i>	4-3
	<i>Water Supplies from Vallejo</i>	4-4
	<i>Recycled Water</i>	4-5
	4.3 Potential Water Supplies.....	4-5
	<i>City of Vallejo</i>	4-6
	<i>City of Rio Vista</i>	4-6
	<i>City of Dixon</i>	4-7
	<i>Groundwater</i>	4-7
	4.4 Reliability of Supply	4-7
	<i>State Water Project</i>	4-7
	<i>Reliability of Vallejo Supply</i>	4-8
	<i>Reliability of Recycled Water Supply</i>	4-9
	<i>Reliability of Supplies for Normal Water Year</i>	4-9
	<i>Reliability of Supplies for Single Dry Year</i>	4-9
	<i>Reliability of Supplies for Multiple Dry Years</i>	4-10
	4.5 Factors Resulting in Inconsistency of Supply.....	4-11
	<i>Climatic Factors</i>	4-11
	<i>Water Quality Factors</i>	4-12
	<i>Environmental Factors</i>	4-13
	<i>Legal Factors</i>	4-13
	4.6 Transfer and Exchange Opportunities	4-13

	<i>Addendum 1 of the Vallejo Water Agreement</i>	4-14
	<i>Addendum 4 of the Vallejo Water Agreement</i>	4-14
	<i>Napa (Informal Mutual Agreement)</i>	4-14
Section 5.0	Water Demand	5-1
5.1	Introduction.....	5-1
5.2	Current and Future Demands	5-1
	<i>Past Demands</i>	5-1
	<i>Current Demands</i>	5-1
	<i>Future Demand Projections</i>	5-2
5.3	Sales to Other Agencies.....	5-4
5.4	Additional Water Uses and Losses	5-4
	Total Water Use	5-5
Section 6.0	Water Supply and Demand Comparisons	6-1
6.1	Projected Normal Water Year Supply and Demand	6-1
6.2	Projected Single Dry Year Supply and Demand Comparison	6-2
6.3	Projected Multiple Dry Year Supply and Demand Comparison	6-3
Section 7.0	Demand Management Measures	7-1
7.1	Introduction.....	7-1
7.2	Descriptions of Demand Management Measures	7-1
	<i>DMM 1 - Residential Water Use Surveys</i>	7-1
	<i>DMM 2 - Residential Plumbing Retrofit</i>	7-1
	<i>DMM 3 - System Water Audits, Leak Detection and Repair</i>	7-2
	<i>DMM 4 - Metering with Commodity Rates</i>	7-2
	<i>DMM 5 - Large Landscape Irrigation Efficiency</i>	7-2
	<i>DMM 6- Residential Clothes Washer Rebates</i>	7-3
	<i>DMM 7 - Public Outreach and Education</i>	7-3
	<i>DMM 8 - School Education</i>	7-3
	<i>DMM 9 - Conservation Programs for Commercial, Industrial, and Institutional Accounts</i>	7-3
	<i>DMM 11 - Conservation Pricing</i>	7-4
	<i>DMM 12 - Conservation Coordinator</i>	7-4
	<i>DMM 13 - Water Waste Prohibition</i>	7-4
	<i>DMM 14 - Residential Toilet Replacement Program</i>	7-4
7.3	Evaluation of Water Conservation Effectiveness	7-5
Section 8.0	Water Supply Projects	8-1
8.1	Introduction.....	8-1
8.2	Planned Water Supply Projects.....	8-1
	<i>Purchase Additional Vallejo Potable Water</i>	8-1
	<i>Purchase Additional Vallejo Raw Water</i>	8-1
	<i>Purchase Entitlements from other Napa County Cities</i>	8-1
	<i>Recycled Water Distribution System</i>	8-1
	<i>Recycled Water Storage</i>	8-1
	<i>Municipal Groundwater Wells</i>	8-2
	<i>NBA Napa Terminal Tank</i>	8-2
8.3	Development of Desalinated Water	8-2

	8.4 Projects for Future Considerations	8-2
Section 9.0	Water Shortage Contingency Plan.....	9-1
	9.1 Introduction.....	9-1
	9.2 Stages of Action.....	9-1
	9.3 Estimate of Minimum Supply for Next Three Years.....	9-1
	<i>SWP Supply</i>	9-2
	<i>Vallejo Water</i>	9-2
	<i>Recycled Water Supply</i>	9-3
	9.4 Water Shortages and Conservation Stages	9-3
	<i>Prohibitions, Penalties, and Consumption Reduction Methods</i> ..	9-3
	<i>Implementation and Enforcement of Water Conservation Stages</i>	9-4
	<i>Penalties and Charges</i>	9-5
	<i>Additional Considerations</i>	9-6
	<i>Analysis of Revenue Impacts of Reduced Sales during Shortages</i>	9-6
	<i>Water Use Monitoring Mechanisms</i>	9-9
	9.5 Catastrophic Supply Interruption Plan.....	9-9
	<i>Disaster Events or Scenarios</i>	9-10
	<i>Concept of Operations</i>	9-11
Section 10.0	Recycled Water Plan	10-1
	10.1 Introduction.....	10-1
	10.2 Existing Facilities	10-1
	<i>Collection System</i>	10-1
	<i>Wastewater Treatment</i>	10-2
	<i>Wastewater Disposal Methods</i>	10-2
	10.3 Recycled Water Use.....	10-2
	<i>Existing Recycled Water Use</i>	10-3
	<i>Projected Recycled Water Use</i>	10-3
	10.4 Encouraging Recycled Water Use	10-4
	10.5 Recycled Water From Napa Sanitation District	10-4

GRAPHS

Graph 3-1 Population – 2000 and Projected to 2025	3-1
Graph 6-1 Projected Normal Year Supply and Demand Comparison	6-1
Graph 6-2 Projected Single Dry Year Supply and Demand Comparison.....	6-2
Graph 6-3 Projected Multiple Dry Year Supply and Demand Comparison	6-3

FIGURES

Figure 3-1	Vicinity Map
Figure 3-2	City Service Area
Figure 4-1	Water Source Map
Figure 4-2	Napa Sanitation District's Recycled Water Service Area
Figure 5-1	Water Demands Outside City's Sphere of Influence

APPENDICES

Appendix A	Urban Water Management Planning Act
Appendix B	January 2006 Public Meeting, Public Notice and UWMP Presentation Slides
Appendix C	April 7, 2005 Public Meeting Presentation Slides
Appendix D	July 7, 2005 Public Meeting; Public Notice, Presentation Slides
Appendix E	Water Supply Agreements
	E-1 SWP Water Agreement
	E-2 NBA Water Agreement (Table A Entitlement)
	E-3 Kern County Water Transfer Agreement
	E-4 Vallejo Water Agreement
	E-5 Yountville Water Transfer Agreement
	E-6 Yountville Interim Water Agreement
	E-7 Napa Interim Water Agreement (Expired)
	E-8 Napa Water Agreement (Expired)
Appendix F	Notice to State Water Project Contractors
Appendix G	Basis for Estimating Water Demands
Appendix H	Water Conservation Reports to the CUWCC
Appendix I	Draft Water Shortage Emergency Plan Ordinance
Appendix J	Recycled Water Implementation Plan

TABLES

Table ES-1 Current and Planned Water Supplies: 2005 – 2025 (Full Entitlement)	ES-2
Table ES-2 Normal Water Year Supply (AFY)	ES-3
Table ES-3 Single Dry Year Supply (AFY)	ES-3
Table ES-4 Multiple Dry Year Supply (AFY)	ES-3
Table ES-5 Total Water Demand	ES-4
Table ES-6 Projected Normal Year Supply and Demand Comparison (AFY)	ES-5
Table ES-7 Projected Single Dry Year Supply and Demand Comparison (AFY)	ES-5
Table ES-8 Projected Multiple Dry Year Supply and Demand Comparison (AFY)	ES-5
Table 1-1 Coordination with Appropriate Agencies	1-3
Table 2-1 Public Meetings	2-1
Table 3-1 Population – 2000 and Projected to 2025	3-2
Table 3-2 Monthly Climatic Averages	3-2
Table 4-1 Current Water Supplies: 2005	4-2
Table 4-2 Current and Planned Water Supplies: 2005 – 2025 (Full Entitlement)	4-3
Table 4-3 Estimated Normal Water Year Deliveries (%)	4-9
Table 4-4 Normal Water Year Supply (AFY)	4-9
Table 4-5 Estimated Single Dry Year Deliveries (%)	4-10
Table 4-6 Single Dry Year Supply (AFY)	4-10
Table 4-7 Estimated Multiple Dry Year Deliveries (%)	4-11
Table 4-8 Multiple Dry Year Supply (AFY)	4-11
Table 5-1 Past, Current, and Projected Accounts By Land Use Designation	5-1
Table 5-2 Past, Current, and Projected Water Use By Land Use Designation	5-2
Table 5-3 Additional Water Uses and Losses	5-4

Table 5-4 Total Water Demand	5-5
Table 5-4a Total Water Demand.....	5-5
Table 6-1 Projected Normal Year Supply and Demand Comparison (AFY)	6-1
Table 6-2 Projected Single Dry Year Supply and Demand Comparison (AFY).....	6-2
Graph 6-2 Projected Single Dry Year Supply and Demand Comparison.....	6-2
Table 6-3 Projected Multiple Dry Year Supply and Demand Comparison (AFY)	6-3
Graph 6-3 Projected Multiple Dry Year Supply and Demand Comparison	6-3
Table 8-1 Future Projects and Resulting Water Supply Made Available (AFY)	8-2
Table 9-1 Water Conservation Stages and Demand Reduction Goals (%)	9-1
Table 9-2 Estimated Normal Water Year Supplies for Next 3 Years (AFY)	9-2
Table 9-3 Estimated Three-Year Minimum Water Supplies (AFY)	9-2
Table 9-4 Water Conservation Stages and Non-Essential Uses of Water/Prohibitions	9-4
Table 9-5 Penalties and Charges during Conservation Stages	9-6
Table 9-6 Water Service Revenues during Normal and Shortage Years.....	9-7
Table 9-7 Conservation Stages and Revenue Impacts.....	9-7
Table 9-8 O&M Costs during Normal and Shortage Years.....	9-8
Table 9-9 Revenues vs. Expenditures during Shortage Years.....	9-9
Table 9-10 Concept of Operations.....	9-12
Table 10-1 Wastewater Collected and Treated – Actual and Projected (AFY).....	10-2
Table 10-2 Projected Use of Recycled Water.....	10-4

KEY ACRONYMS AND ABBREVIATIONS USED IN THIS DOCUMENT

<i>ABAG</i>	Association of Bay Area Governments
<i>Act</i>	Urban Water Management Planning Act
<i>ADWF</i>	Average Dry Weather Flow
<i>AF</i>	Acre-feet
<i>AFY</i>	Acre-feet per year
<i>BMP(s)</i>	Best Management Practice(s)
<i>CDHS</i>	California Department of Health Services
<i>City</i>	City of American Canyon
<i>CSIP</i>	Catastrophic Supply Interruption Plan
<i>CUWCC</i>	California Urban Water Conservation Council
<i>CVP</i>	Central Valley Project
<i>DMM</i>	Demand Management Measure
<i>DWR</i>	California Department of Water Resources
<i>EGIA</i>	Electric and Gas Industries Association
<i>EOC</i>	Emergency Operations Center
<i>ERP</i>	Water System Emergency Response Plan
<i>ETo</i>	Evapo-transpiration of Common Turf Grass
<i>gpcpd</i>	Gallons per capital per day
<i>gpdpa</i>	Gallons per day per acre
<i>gpd</i>	Gallons per day
<i>gpm</i>	Gallons per minute
<i>MBR</i>	Membrane bioreactor
<i>mgd</i>	Million gallons per day
<i>MOU</i>	Memorandum of Understanding
<i>Napa</i>	City of Napa
<i>Napa County</i>	County of Napa
<i>Napa Flood</i>	Napa County Flood Control and Water Conservation District

KEY ACRONYMS AND ABBREVIATIONS USED IN THIS DOCUMENT (CONTINUED)

<i>NBA</i>	North Bay Aqueduct
<i>NPDES</i>	National Pollutant Discharge Elimination System
<i>OCAP</i>	Operating Criteria and Plan
<i>O&M</i>	Operations and Maintenance
<i>SFBRWQCB</i>	San Francisco Bay Regional Water Quality Control Board
<i>SID</i>	Solano Irrigation District
<i>SCADA</i>	Supervisory Control and Data Acquisition
<i>SWRCB</i>	California State Water Resources Control Board
<i>SWP</i>	State Water Project
<i>TOC</i>	Total Organic Carbon
<i>TTHMs</i>	Total Trihalomethanes
<i>UWMP</i>	Urban Water Management Plan
<i>WRF</i>	Water Recycling Facility
<i>WWTP</i>	Wastewater Treatment Plant
<i>Vallejo</i>	City of Vallejo

Executive Summary

Purpose and Need

The City of American Canyon has prepared its first Urban Water Management Plan (UWMP) in compliance with the California Water Code, which requires water suppliers with 3,000 or more connections to prepare such a plan every five years. The City currently has approximately 4,750 connections.

The purpose of the UWMP is to:

- Evaluate water supplies necessary to meet demands over at least a 20-year period for normal water conditions, single dry year conditions, and multiple dry year conditions;
- Identify measures to be implemented or projects to be undertaken to reduce water demands and address water supply shortfalls;
- Identify stages of action to address up to 50% reduction in water supplies during dry water years;
- Identify actions to be implemented in the event of a catastrophic interruption in water supplies; and
- Assess the reliability of the sources during normal, dry and multiple dry water years.

Water Supply

The City's water supply is from the following existing water sources and is further summarized in Table ES-1.

- State Water Project (SWP) water;
- Permit water (raw water) from the City of Vallejo (Vallejo);
- Treated water from Vallejo;
- Treated water from the City of Napa (Napa); and
- Recycled water from the City of American Canyon's (City's) treatment plant.

Table ES-1
Current and Planned Water Supplies: 2005 – 2025 (Full Entitlement)

Year	2005	2010	2015	2020	2025
Water Supply (AFY):					
SWP Supply	4,700	4,950	5,200	5,200	5,200
Other Sources/Supplies					
Vallejo Permit Water	500	500	500	500	500
Vallejo Treated Water ^a	629	1,352	2,075	2,641	3,207
Groundwater (None)	0	0	0	0	0
Surface Diversions (None)	0	0	0	0	0
Transfers In or Out ^b (None)	0	0	0	0	0
Exchanges In or Out ^b	0	0	0	0	0
City Recycled Water ^c	107 ^d	858	858	858	858
Napa San Recycled Water	0	75	150	226	226
Desalination (None)	0	0	0	0	0
Total	5,936	7,735	8,783	9,425	9,991

^a "Treated water from Vallejo" includes the maximum contractual amount that *may be purchased* by the City.

^b The Vallejo water agreement Addendum 4 provides for a 3-way exchange whereby American Canyon would transfer 250 AF of its Table A allotment to Yountville and Vallejo would provide 250 AF of permit water to American Canyon to "backfill" its supply. This term of Addendum 4 is set to expire December 2005. It is anticipated that the Yountville exchange will not occur because contractual "pre-conditions" will not be met by that time.

^c American Canyon Recycled Water Implementation Plan, dated September 22, 2005.

^d Though 35 AFY was stated as the supply for 2005 for Green Island Vineyard, in the body of the Recycled Water Implementation Plan, the correct figure is 107 AFY, as stated in the tables in the Recycled Water Plan's appendices.

Reliability of the City's water supply is analyzed in the UWMP under normal, single dry, and multiple dry water years. The California Department of Water Resources (DWR) prepared a draft reliability report for SWP water and was the basis for the analysis for that water supply source. In Table ES-1, the amount of SWP water supply available to the City indicated is the City's "full entitlement" supply. This is the maximum supply the City is entitled to from the SWP; however, this full entitlement supply is not available during normal rainfall years. The City cannot rely on receiving this full entitlement amount.

For the Vallejo water source, the reliability of that water supply is based on information provided by Vallejo water representatives. The City's recycled water assumes a reliability that considers reduction in the amount of wastewater during drought conditions. Although the City receives treated Napa water, it is available only under emergency conditions and is really a source that provides operational flexibility. For this reason the Napa water source is not included in the reliability assessment. The following tables, tables ES-2 through ES-4, summarize the City's water supply under normal, single dry, and multiple dry year conditions.

In Table ES-2, the City's SWP water supply is presented as approximately 70% of the City's full entitlement, as that is the amount available to the City during normal water years.

Table ES-2
Normal Water Year Supply (AFY)

Year	2005	2010	2015	2020	2025
SWP Supply ^a	3,243	3,515	3,796	3,900	4,004
Other Sources/Supplies ^b					
Vallejo Permit Water	500	500	500	500	500
Vallejo Treated Water	629	1,352	2,075	2,641	3,207
Vallejo Raw Water	500	500	500	500	500
City Recycled Water ^c	107	858	858	858	858
Napa San Recycled Water	0	75	150	226	226
Total	4,979	6,800	7,879	8,625	9,295

^a SWP supply for normal years based on DWR reliability report Memorandum No. 05-08 dated May 25, 2005.

^b Other sources and supply amounts are shown in Table 4-2.

^c American Canyon Recycled Water Implementation Plan, September 22, 2005, Winzler & Kelly Consulting Engineers, Inc.

Table ES-3
Single Dry Year Supply (AFY)

Year	2005	2010	2015	2020	2025
SWP Supply ^a	1,316	1,386	1,456	1,456	1,508
Other Sources/Supplies ^b					
Vallejo Permit Water	450	450	450	450	450
Vallejo Treated Water	566	1,217	1,868	2,377	2,886
Vallejo Raw Water	450	450	450	450	450
City Recycled Water ^c	96	772	772	772	772
Napa San Recycled Water	0	68	135	203	203
Total	2,878	4,343	5,131	5,708	6,269

^a SWP supply for normal years based on DWR reliability report Memorandum No. 05-08 dated May 25, 2005.

^b Other sources and supply amounts are shown in Table 4-2.

^c American Canyon Recycled Water Implementation Plan, September 22, 2005, Winzler & Kelly Consulting Engineers, Inc.

Table ES-4
Multiple Dry Year Supply (AFY)

Year	2005	2010	2015	2020	2025
SWP Supply ^a	1,786	1,881	1,976	1,976	1,976
Other Sources/Supplies					
Vallejo Permit Water	450	450	450	450	450
Vallejo Treated Water	566	1,217	1,868	2,377	2,886
Vallejo Raw Water	450	450	450	450	450
City Recycled Water	96	772	772	772	772
Napa San Recycled Water	0	68	135	203	203
Total	3,348	4,838	5,651	6,228	6,737

^a SWP supply for multiple dry water year is defined as 38% of SWP contract amount. Contract amounts for the various water supplies are shown in Table 4-2.

Water Demand

The water demand projections in the UWMP were developed using a thorough analysis of water billing data and land use information. Water projections from past studies were not based on an analysis of existing water use data but based on industry estimates for water use and therefore not as accurate.

It is recognized that the City and County are beginning the process of updating their General Plans. The General Plan updates could include revisions that could impact water demand projections developed for this UWMP. However, the Act requires that the City complete the UWMP in 2005 and therefore the assumptions used in developing future water demands need to be based on the best available information. The water demand projections summarized in this UWMP can be used as guidance for the General Plan update processes, and the 2010 UWMP will take into account revisions made to the City and County General Plans at that time.

Urban growth within the city limits, urban growth outside the city limits but within the water service area, vineyard demands, and unmetered uses and water losses were considered when developing future demand projections. Table ES-5 summarizes the existing and projected water demands for the entire service area.

Table ES-5
Total Water Demand

Demand Type	Water Demand (AFY)					
	2000	2005 ^a	2010	2015	2020	2025
Customer Demand	2,265	3,432	4,959	6,080	6,232	6,387
Sales to Other Agencies	0	0	0	0	0	0
Unmetered Uses and Losses	227	343	496	608	623	639
Total	2,492	3,775	5,455	6,688	6,855	7,026

^a Estimated Water Use for City.

Supply and Demand Comparisons

Based on a comparison of the City's water demand to its available supply under normal, single dry, and multiple dry year conditions, the following findings were made:

- For (2005) and projected future demands, the City has ample supply for normal year conditions.
- For current demands (2005) and for demands projected for full buildout (estimated to occur in 2015), the City has up to a 24% supply shortfall for single dry year conditions.
- For multiple dry year conditions, the City currently has an 11% shortfall, which is projected to increase to a 16% projected shortfall at buildout in 2015. The shortfall is projected to decrease to 4% in 2025.

Table ES-6 through ES-8 summarizes the supply and demand comparisons under normal, single dry, and multiple dry year conditions.

Table ES-6
Projected Normal Year Supply and Demand Comparison (AFY)

Year	2005	2010	2015	2020	2025
Total Projected Supply	4,979	6,800	7,879	8,625	9,295
Total Projected Demand	3,775	5,455	6,688	6,855	7,026
Difference (Supply minus Demand)	+1,204	+1,345	+1,191	+1,770	+2,269
Percent Difference (Surplus or Shortfall)	+32%	+25%	+18%	+26%	+32%

Table ES-7
Projected Single Dry Year Supply and Demand Comparison (AFY)

Year	2005	2010	2015	2020	2025
Total Projected Supply	2,878	4,343	5,131	5,708	6,269
Total Projected Demand	3,775	5,455	6,688	6,855	7,026
Difference (Supply minus Demand)	-897	-1,112	-1,557	-1,147	-757
Percent Difference	-24%	-20%	-23%	-17%	-11%

Table ES-8
Projected Multiple Dry Year Supply and Demand Comparison (AFY)

Year	2005	2010	2015	2020	2025
Total Projected Supply	3,348	4,838	5,651	6,228	6,737
Total Projected Demand	3,775	5,455	6,688	6,855	7,026
Difference (Supply minus Demand)	-427	-617	-1,037	-627	-289
Percent Difference	-11%	-11%	-16%	-9%	-4%

Addressing the Supply Shortfalls

The UWMP describes the following ways to address the supply shortfalls during drought conditions:

- Implement demand management measures (also known as water conservation measures);
- Implement a water shortage contingency plan; and
- Implement water supply projects.

The City currently has a water conservation program and the UWMP identifies various measures that can be actively pursued in order to reduce overall water consumption. The UWMP also presents a water shortage contingency plan that identifies various methods of reducing water consumption during various stages of water shortage due to drought or other emergencies.

Water supply projects that may be undertaken include:

- Purchase additional Vallejo water;
- Purchase water entitlements from other Napa County cities;
- Purchase water entitlements from agricultural users;
- Expand recycled water distribution system;
- Consider creating recycled water storage;
- Develop municipal groundwater wells (if possible); and
- Improve the NBA Napa terminal tank.

Section 1.0 Introduction to this Document

1.1 Purpose

The purpose of developing an Urban Water Management Plan (UWMP) is to:

- Evaluate water supplies necessary to meet demands over at least a 20-year period for normal water year conditions, single dry year conditions, and multiple dry year conditions;
- Identify measures to be implemented or projects to be undertaken to reduce water demands address water supply shortfalls;
- Identify stages of action to address up to 50% reduction in water supplies during dry water years;
- Identify actions to be implemented in the event of a catastrophic interruption in water supplies; and
- Assess the reliability of the source during normal, dry, and multiple dry water years.

1.2 Law

The Urban Water Management Planning Act (Act) is codified in California Water Code Sections 10610 through 10656 and has been amended a number of times up until 2003.

The Act requires urban water suppliers with 3,000 or more connections, or who supply at least 3,000 acre-feet of water per year, to submit UWMPs to the DWR every five years in years ending in 0 or 5. The City of American Canyon (City or American Canyon) has approximately 4,750 active accounts¹ and a projected water demand of 4,118 acre-feet of water in 2005. Within the past five years, the City has passed the 3,000-connection threshold and is therefore preparing its first UWMP. See Appendix A for a copy of the Act.

1.3 Structure of Plan

The content of this UWMP follows the January 18, 2005 *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan* developed by the DWR, and has been prepared in compliance with the Act. The UWMP is organized into 10 sections and appendices, as listed below:

Section 1.0 Introduction to this Document

Section 2.0 Public Participation, Adoption, and Implementation

Section 3.0 Service Area

¹ City of American Canyon 2005 water billing database.

Section 4.0	Water Supply
Section 5.0	Water Demand
Section 6.0	Water Supply and Demand Comparisons
Section 7.0	Demand Management Measures
Section 8.0	Water Supply Projects
Section 9.0	Water Shortage Contingency Plan
Section 10.0	Recycled Water Plan

1.4 Appropriate Level of Planning

The Act specifies the required content of UWMPs and allows for the level of detail provided in an UWMP to reflect the size and complexity of the water supplier. The Act requires a minimum 20-year projection for most of the information required.

1.5 Agency Coordination

The City regularly meets with other water purveyors. The City meets monthly with State Water Project (SWP) member units of the Napa County Flood Control and Water Conservation District (“Napa Flood”). Napa Flood is the agency that contracts directly with the DWR for purchase of SWP water. The member units include the Cities of American Canyon, Napa, Calistoga, and St. Helena, and the Town of Yountville.

The City also meets periodically with Solano County SWP contractors who purchase SWP water including the Solano County Water Agency, Solano Irrigation District, Cities of Vallejo, Fairfield, Benicia, and Vacaville. These meetings keep the City apprised of water supply and delivery issues that affect, or have the potential to affect, the City’s ability to provide water service to its customers within the County of Napa (Napa County) to maximize local resources and minimize the need to import water.

The City has been directly involved in the preparation of the 2050 Napa Valley Water Resources Study (“2050 Study”). The 2050 Study is currently being conducted for the American Canyon, Napa Flood, the Napa Sanitation District, the Cities of Napa, Calistoga, and St. Helena, and the Town of Yountville. The purpose of the 2050 Study, like the purpose of this UWMP, is to evaluate the availability of local and imported water supplies within Napa County and determine their adequacy to meet the existing and project future water demands of Napa County customers. The 2050 Study, however, is a regional, more long-range, study that focuses on water use in the Napa Valley study area.

Because Napa County and City of Vallejo (Vallejo) are the primary sources of contracted water for the City, the City will provide these agencies copies of its draft UWMP for review; and

conversely, the City will obtain copies of these agencies' draft UWMPs for review. Table 1-1 identifies the various agencies that the City will have coordinated with during the UWMP preparation process.

Table 1-1
Coordination with Appropriate Agencies

Agency	Contacted for Assistance	Commented on the Draft	Attended Public Meetings	Received Copy of Draft	Sent Notice of Intention to Adopt
Napa County Flood	X			X	X
Vallejo	X		No Other	X	X
Napa County Planning		No	Agencies	X	
Rio Vista	X	Comments	Attended		
Dixon	X	Received	Public		
Solano County Water Agency	X		Meetings	X	
Reclamation District #2068	X				

During the process of completing this UWMP, the City has begun discussions with other water purveyors who may be able to provide the City with additional supply. This is further discussed in Section 4.3.

Elements of this UWMP are being discussed and reviewed with various departments within the City, such as the Planning and Building Departments, City Manager's Office, and City Council.

Section 2.0 Public Participation, Adoption, and Implementation

2.1 Introduction

As an urban water supplier, the City is required by the Act to encourage active involvement of the community within the service area prior to and during the preparation of the UWMP. The City is also required to make the draft of the UWMP available for public review and to hold a public hearing regarding the findings of the UWMP prior to its adoption.

A summary of the public review meetings for the UWMP is shown in Table 2-1 below and the meetings are described in detail in the paragraphs that follow.

The Act requires a discussion of the previous UWMP and whether implementation occurred as planned. Because the City did not meet the population or connection requirements which trigger the UWMP Act in the year 2000, the City did not develop a 2000 UWMP. Therefore, there is no discussion on implementation of the previous UWMP.

**Table 2-1
Public Meetings**

Date	Meeting Type	Description of Meeting
April 7, 2005	City Council	UWMP Scoping
July 7, 2005	City Council	Water Conservation
January 5, 2005	City Council	Presentation of Draft UWMP
February 2, 2006 (Planned)	City Council	Adoption of UWMP

2.2 Public Scoping Meeting - April 7, 2005

In an effort to obtain input from the City Council and the public in the development of the UWMP, the City's Public Works Department held a public scoping meeting on April 7, 2005 at the City Hall Council Chambers at a regularly scheduled City Council meeting. The purpose of the scoping meeting was to inform the public and the City Council of the elements of an UWMP and the regulatory background, which requires the City to complete one and to obtain input from the City Council and the general public.

The agenda for the meeting was posted at City Hall, the Fire District office, and the community center six days prior to the meeting. Winzler & Kelly Consulting Engineers (Winzler & Kelly) made a presentation to the public and City Council about the elements of an UWMP and requested the public's input. There were no comments made or questions asked from members of the public. A copy of the Power Point presentation is presented in Appendix C.

2.3 Water Supply and Water Conservation Public Meeting - July 7, 2005

A second public meeting was held on July 7, 2005, at the City Hall Council Chambers at a regularly scheduled City Council meeting to discuss the progress of the UWMP, projected shortfalls and water conservation tools that could be cost-effectively implemented to reduce shortfalls. A Public Notice was posted at City Hall, the Fire District office, and the community center six days prior to the meeting. Additionally, the Public Notice was sent to potentially

interested parties, including members of the American Canyon Planning Commission and developers working in the area.

The Director of Public Works gave a presentation on the California Water Plan and how the state's water issues affect American Canyon, including a projected shortfall in water supply in future years. Winzler & Kelly made a presentation regarding the possibilities of using water conservation programs to reduce demand for water, thereby decreasing the future projected water supply shortfall. A copy of each presentation, the Notice of Public Meeting, and the meeting notification mailing list are included in Appendix D.

A discussion followed between staff and the City Council regarding specific aspects of water conservation and other water-related topics. No comments or questions were presented by members of the public.

2.4 Presentation of the Draft UWMP – January 5, 2006

Copies of the draft UWMP were provided or made available to the public on December 15, 2005 as well as to the City Council. On January 5, 2006 the findings and conclusions of the UWMP were presented to City Council and the public. Several comments were received from the City Council and from members of the public. A copy of the Power Point presentation given that night is presented in Appendix B.

2.5 Consideration of Adoption of the Final UWMP – February 2, 2006

The Final UWMP is scheduled for adoption by City Council on this date. The resolution adopting this UWMP will be available shortly after February 2, 2006.

Section 3.0 Service Area

3.1 Introduction

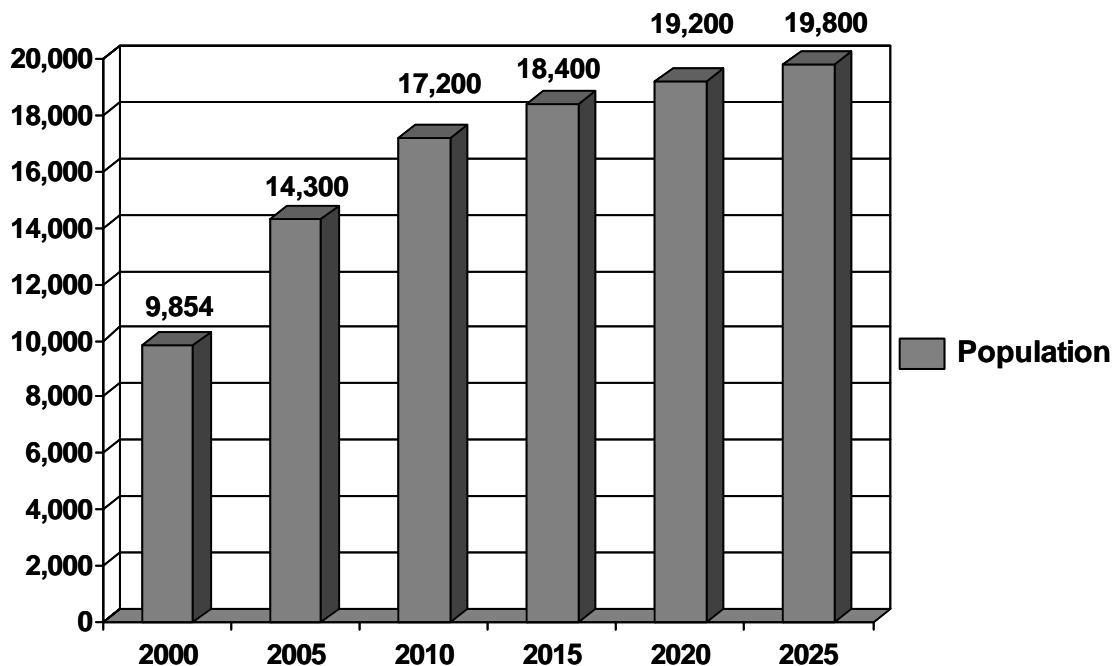
The City is located approximately 35 miles northeast of San Francisco at the southern end of Napa County (Figure 3-1). The City's water service area encompasses the city limits, as well as the industrial/commercial area to the north along State Highway 29, including the Napa Airport Industrial Park (Figure 3-2). The service area is approximately 5.0 square miles and serves residential, commercial, and industrial needs. Elevations in the existing service area range from approximately 5 feet above mean sea level to approximately 150 feet above mean sea level.

The water distribution system contains multiple pressure zones. The principal water mains in the distribution system range in size from 14 to 20 inches. Most of the distribution grid piping in the older sections of the City range in size from 4 to 6 inches, while the newer areas are served by pipes 6 to 8 inches in diameter.

3.2 Population: Current and Projected

The City has grown steadily since 1980. The Association of Bay Area Governments (ABAG) population projections for the City are presented in Table 3-1 and Graph 3-1.² ABAG projects a 75% growth rate for the City between 2000 and 2010. The City's average annual population growth rate is projected to slow to approximately 1% between 2010 and 2025.

Graph 3-1 Population – 2000 and Projected to 2025





**FIGURE 3-1
VICINITY MAP
CITY OF AMERICAN CANYON**

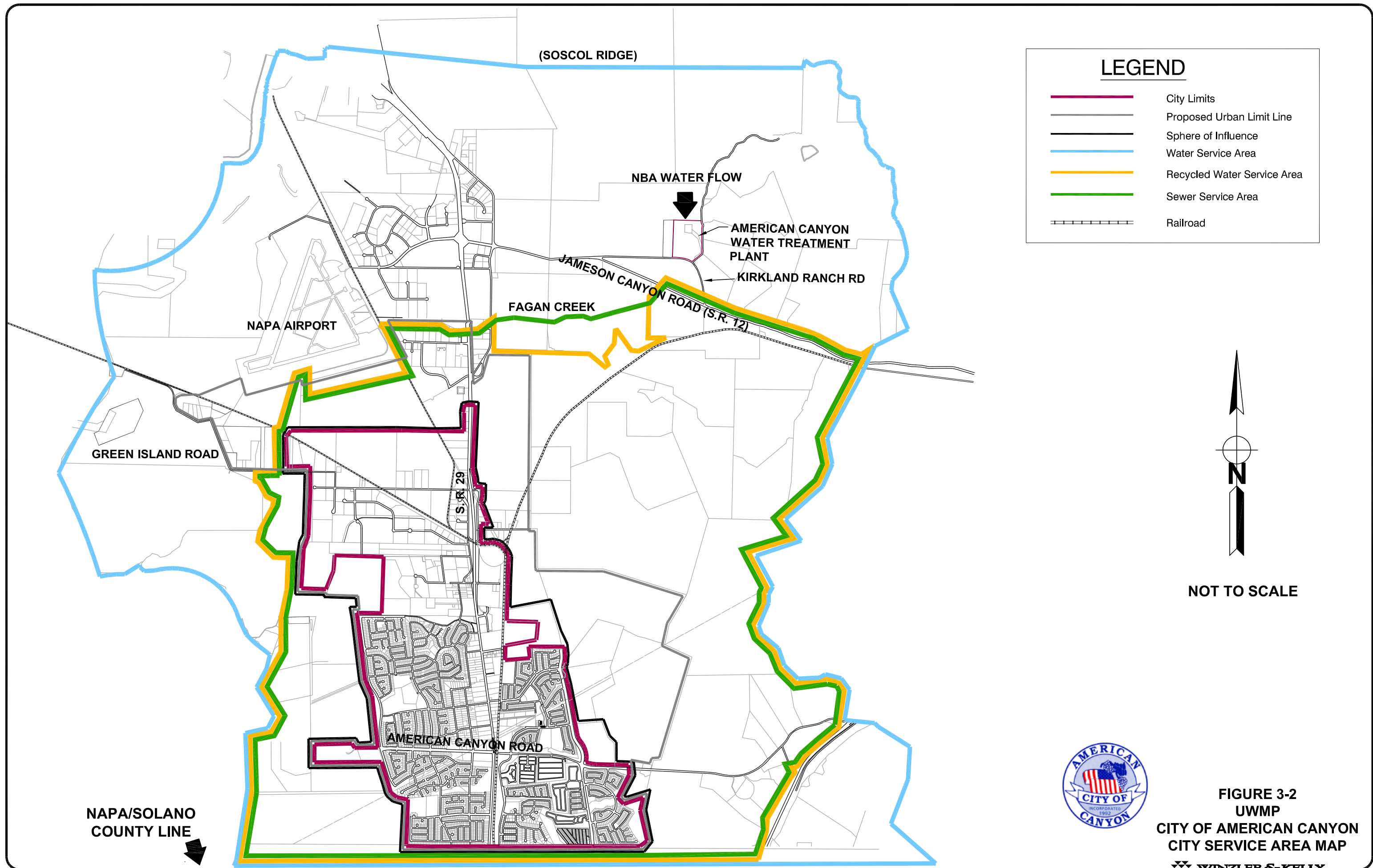


Table 3-1
Population – 2000 and Projected to 2025

Year	2000	2005	2010	2015	2020	2025
Population	9,854	14,300	17,200	18,400	19,200	19,800
Average Increase ^a	None	9.0%	4.1%	1.4%	0.9%	0.6%

^a Average annual increase during the 5-year period.

3.3 Climate

The climate of the City is typical of that of the Napa and Solano County areas, characterized by summers that are dry and warm, and winters that are relatively mild with the majority of rainfall occurring during this season. The regional averages of the rate of evapo-transpiration of common turf grass (ETo), rainfall, and temperature are summarized in Table 3-2 below.

Table 3-2
Monthly Climatic Averages

Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Annual Total
Standard Monthly Average ETo ^a (inches)	0.82	1.49	3.09	4.57	5.46	6.61	6.89	6.18	4.71	3.52	1.41	1.02	45.77
Average Rainfall (inches) ^b	4.87	4.55	3.33	1.65	0.68	0.22	0.02	0.08	0.28	1.39	3.07	4.59	24.72
Average Temperature (°F) ^b	47.7	51.2	53.7	56.6	61.0	65.5	67.4	67.4	66.7	62.1	54.2	48.2	58.5

^a ETo data was obtained from CIMIS website, Station Number 109, Carneros, San Francisco Bay Region.

^b Average rainfall and temperature data were obtained from NOAA website, Napa State Hospital, years 1917 to 2005.

The average annual rainfall and ETo for the region is approximately 25 and 46 inches per year, respectively. ETo is a measurement of water evaporation combined with plant transpiration and is expressed in the form of a rate, typically inches per time period. In other words, ETo is the amount of water needed for common turf to grow in a specific region.

The average annual ETo for the region is approximately 21 inches more than the average annual precipitation. Because of this difference, and because 90% of the annual precipitation occurs between the months of November and April, growing turf in this region requires a significant amount of irrigation during the dry season.

² Total population projections obtained from ABAG, "Projections 2005," pg. 152.

Section 4.0 Water Supply

4.1 Introduction

The City currently meets customer water demands by supplying water from the following existing sources:

- SWP water;
- Permit water from Vallejo;
- Treated water from Vallejo;
- Treated water from Napa; and
- Recycled water from the City's treatment plant.

Other than recycled water from the City's wastewater treatment plant (WWTP) and Napa Sanitation District, all of the City's raw water supplies are transported via the North Bay Aqueduct (NBA) system. The City does not currently use groundwater as a supply.

Also included in this section are a description of the reliability of the City's water supply during an average year, dry year and multiple dry years, and an evaluation of the City's ability to meet its demands over a 20-year period under these hydrologic conditions. In addition to consideration for seasonal or climatic conditions, the reliability analysis also considers legal, environmental, and water quality conditions.

Although the City has an informal agreement with the City of Napa (Napa) for the purchase of treated water, this water supply was not included in the reliability assessment since it is presumed, for purposes of this UWMP, that Napa treated water will not be available during dry and multiple dry year conditions. Napa treated water is only available under emergency conditions and provides operational flexibility, for example, providing water to customers even when the American Canyon Water Treatment Plant is off-line for an extended period of time.

In addition to a supply reliability assessment, the Act requires a water shortage contingency plan that would identify steps the City would take to address a reduction in water supply of up to 50%. Because the City's water supply consists largely of SWP water, an additional water shortage scenario was added to address steps that are needed if a 5% delivery of SWP water occurs. The contingency also identifies the steps the City would take to address an immediate interruption in its water supply due to catastrophic emergencies such as an earthquake. The contingency plan is described in Section 9 of this UWMP.

4.2 Current and Planned Water Supplies

The City's current water supplies are summarized in Table 4-1 below. Table 4-2 shows the City's increases in its water supplies based on various water contracts. Treated water from Napa is not included in the table because the amount of water that is purchased from Napa comes from American Canyon's NBA Table A allotment and is not an additional supply. Copies of the water supply agreements are presented in Appendix E.

Table 4-1
Current Water Supplies: 2005

Agency Source	Water Supply	Date of Agreement	Max. Supply ^a (AFY)	Total Supply ^b (AFY)
State Water Project (SWP) Supply				
Napa County	Table A allotment	1/4/1967	4,700	4,700
Calistoga	Transfer of water	1998	(500)	
Kern County Water Agency	Napa County	9/19/2000	500	
Other Sources/Supplies				
Vallejo Agreement and Addendum 3	Vallejo treated water ^c	6/13/1996	629	1,164
Vallejo Addendum 2	Permit water exchange for SWP Table A transfer to Calistoga	6/4/1998	500	
American Canyon	Recycled water	NA	107	
Total				5,936
Emergency Supplies				
Vallejo Addendum 1	Emergency supply for raw water	7/18/1996	500 ^d	
Napa (Informal Agreement)	Emergency supply for treated water	NA	Mutual Agreement ^e	

^a "Maximum supply" is the ultimate water supply amount the City will receive under the terms of their water contract.

^b "Total supply" is the additive amount of water supply taking into account each water supply source.

^c The volume indicated in Table 4-1 for "maximum supply" for Vallejo treated water only includes the portion the City has paid for. Additional water *may be purchased* under the terms of the contract with Vallejo.

^d Emergency supply is only available during SWP water curtailment and not during normal year SWP delivery.

^e Amount of treated water purchased from Napa is counted against American Canyon's Table A entitlement.

Table 4-2
Current and Planned Water Supplies: 2005 – 2025 (Full Entitlement)

Year	2005	2010	2015	2020	2025
Water Supply (AFY):					
SWP Supply	4,700	4,950	5,200	5,200	5,200
Other Sources/Supplies					
Vallejo Permit Water	500	500	500	500	500
Vallejo Treated Water ^a	629	1,352	2,075	2,641	3,207
Groundwater (None)	0	0	0	0	0
Surface Diversions (None)	0	0	0	0	0
Transfers In or Out ^b (None)	0	0	0	0	0
Exchanges In or Out ^b	0	0	0	0	0
Recycled Water ^c	107 ^d	858	858	858	858
a San Recycled Water	0	75	150	226	226
Desalination	0	0	0	0	0
Total	5,936	7,735	8,783	9,425	9,991

^a "Treated water from Vallejo" includes the maximum contractual amount that *may be purchased* by the City.

^b The Vallejo water agreement Addendum 4 provides for a 3-way exchange whereby American Canyon would transfer 250 AF of its Table A allotment to Yountville and Vallejo would provide 250 AF of permit water to American Canyon to "backfill" its supply. This term of Addendum 4 is set to expire December 2005. It is anticipated that the Yountville exchange will not occur because contractual "pre-conditions" will not be met by that time.

^c American Canyon Recycled Water Implementation Plan, dated September 22, 2005.

^d Though 35 AFY was stated as the supply for 2005 for Green Island Vineyard, in the body of the Recycled Water Implementation Plan, the correct figure is 107 AFY, as stated in the tables in the Recycled Water Plan's appendices.

State Water Project

The SWP diverts water from the Sacramento/San Joaquin Delta at the Barker Slough Pumping Plant and conveys the water through the NBA approximately 21 miles to the Cordelia Forebay. The SWP/NBA system is shown in Figure 4-1. SWP water is pumped from the Cordelia Forebay and conveyed an additional 6 miles to the Napa Turnout Reservoir at Jamison Canyon and conveyed via pipeline to the American Canyon water treatment plant. The City's SWP entitlement is treated at the American Canyon water treatment plant or delivered as raw water to the City's irrigation customers.

Table A Allotment

Napa Flood executed a *Water Supply Contract* with the DWR for SWP water on December 19, 1963. As the SWP contractor, Napa Flood subcontracts to member units throughout the Napa County, including the City. The City executed a *Water Contract for Water Supply from North Bay Aqueduct* with Napa County on January 4, 1967, which was last amended on December 21, 1982. In the agreement, the City is allocated annual allotments of SWP water known as Table A (hereinafter referred to as "Table A allotment"). The City's Table A allotment is 4,700 acre-feet in 2005 and annually increases to its ultimate amount of 5,200 acre-feet in 2015. The current water contract with Napa County is through 2035 with extensions occurring as necessary.



FIGURE 4-1
WATER SOURCE MAP
CITY OF AMERICAN CANYON

Kern County Water Agency Purchase

Napa Flood obtained an additional 4,025 acre-feet of SWP water from the Kern County Water Agency in 2000 and made this water available to its member units. The City purchased a water supply of 500 acre-feet per year (AFY) of the Kern County SWP water in 2000. The water is conveyed through the NBA system and is treated at the American Canyon water treatment plant or delivered as raw water to the City's irrigation customers.

Water Supplies from Vallejo

The City entered into a water service agreement with Vallejo on May 1, 1996 (hereinafter referred to as the "Vallejo Water Agreement") to purchase several types of water, described below.

Treated Water

The Vallejo Water Agreement provided for the City's purchase of 629 acre-feet per year of treated SWP/NBA water supply. Under the terms of the agreement, the City also has an option to purchase an additional 723 acre-feet of treated water per year by May 2006; 723 acre-feet by May 2011; 566 acre-feet by May 2016; and 566 acre-feet by May 2021. If the option for any of the years listed is not exercised by that date, the option expires for that block of water supply. The cost of the treated water supply is high and the City opted out of the 723 acre-feet supply that was available in May 2001. However, in future years, the City should consider the purchase of the treated water supply to meet its future water demands if it is not able to secure other, less expensive supplies.

Emergency Water

The Vallejo Water Agreement was amended (Addendum 1) on July 18, 1996 to provide for the City's purchase of up to 500 acre-feet of water per year for *emergency* purposes. Under the addendum, an emergency is defined as a condition whereby the City's SWP/NBA entitlement is reduced due to environmental or other constraints. Under "normal" years where the City's Table A Entitlement is not curtailed, emergency water is not available for purchase.

Vallejo Permit Water

Vallejo also has an appropriative water right for Sacramento Bay-Delta water under License 007848 from the DWR pre-dating the construction of the SWP. This water supply is commonly referred to as "permit water." Permit water is pumped from Lindsey Slough and delivered through the NBA system and is not part of the SWP.

On June 4, 1998, the Vallejo Water Agreement was amended (Addendum 2) to provide for a 3-party agreement for the "wheeling" of 500 acre-feet per year of permit water to the City of Calistoga (Calistoga) from Vallejo. Calistoga is not eligible to receive permit water because it is not defined as being in the "area of use." Therefore, in order for Calistoga to receive the 500 acre-feet per year water supply, American Canyon permanently transferred 500 acre-feet per

year of its Table A allotment to Calistoga and in turn, Vallejo provided 500 acre-feet per year of permit water to American Canyon. This addendum has no net effect on the City's total water supply. However, according to Vallejo water representatives, permit water is more reliable than SWP water because it is less prone to curtailment.

Vallejo – Yountville Exchange

On December 7, 2000 the Vallejo Water Agreement was amended (Addendum 4) to provide for a 3-party agreement for the "wheeling" of 250 acre-feet per year of permit water to the Town of Yountville from Vallejo. This addendum is similar to Addendum 2 with Calistoga. The purchase and exchange of the 250 acre-feet would yield no net water supply for American Canyon. The terms of the agreement are set to expire within five years of Addendum 4, which is December 7, 2005. The agreement requires specific pre-conditions that have to be met in order for the exchange to occur. It is anticipated that the pre-conditions will not be met by the expiration date and the addendum will terminate at that time.

Recycled Water

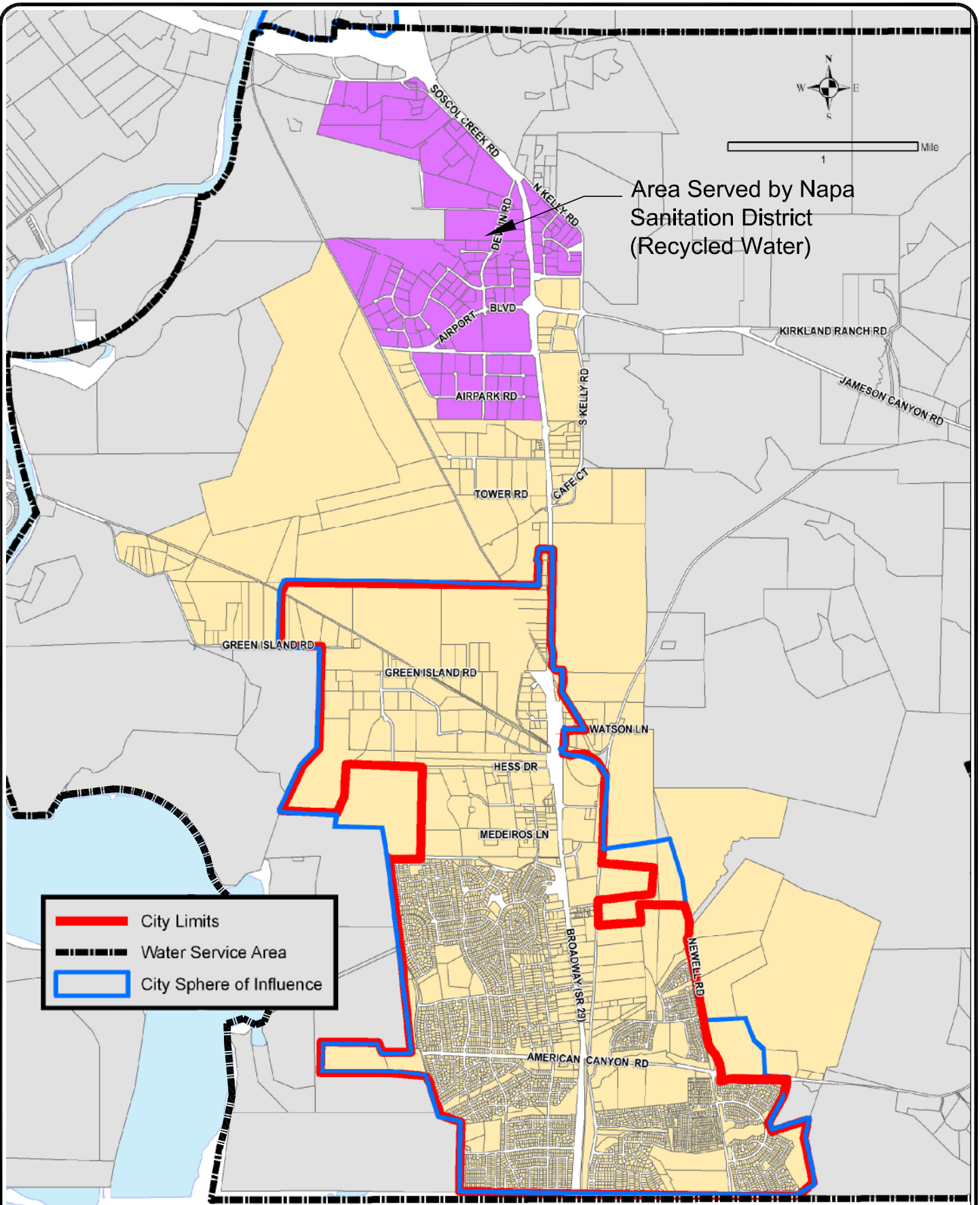
Since July 2005, the City has been operating a Water Recycling Facility (WRF) under the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) Order No. 00-003 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA 0038768. The City currently has a user agreement with Green Island Vineyards for an annual estimated delivery of 107 acre-feet. Water deliveries will be expanded to an estimated 858 acre-feet per year by the year 2008. The potential recycled water customers are currently using either treated potable or raw NBA for irrigation. The Recycled Water Implementation Plan is presented in detail in Section 10 of this UWMP.

The Napa Sanitation District (District) to the north has its own recycled water program and plans to supply recycled water to the Napa County Airport industrial area, which falls within the City's potable water service area. According to the District's final draft of their Strategic Plan for Recycled Water Use in the Year 2020 (Strategic Plan) dated August 2005, the District plans to have recycled water available to this area for landscape irrigation by 2006 and maximum usage occurring by 2020 (see Strategy No. 3, Phase 1).

The area within the City's potable water service area that will receive recycled water offsets from Napa Sanitation District is shown in Figure 4-2. The Figure was developed using Figure ES-3 from the District's Strategic Plan. Applying an average landscape irrigation demand rate of 0.28 AFY per gross acre, which is consistent with the District's Strategic Plan, the total potential recycled water offset from the District is 226 AFY. It is assumed that this offset will occur at a constant growth rate between 2006 and 2020.

4.3 Potential Water Supplies

The City is exploring other potential water supply purchases with other agencies and is actively discussing options with these agencies. Water supply negotiations can take many years to secure and the City recognizes the need to begin those discussions now.



Not to Scale

FIGURE 4-2
NAPA SANITATION DISTRICT'S
RECYCLED WATER
SERVICE AREA

City of Vallejo

The City has discussed purchasing additional raw water from Vallejo. While Vallejo has a large supply of Solano Project Water from Lake Berryessa, this water is not available to American Canyon because American Canyon is not in the “area of use” as defined by the U.S. Bureau of Reclamation, the operator of the Solano Project. Although this water supply is not available to the City, the City should continue discussions with the appropriate agencies, including the Solano County Water Agency, to see if there is a possibility of obtaining Solano Project water during emergency or drought conditions. Having Solano Project water available during emergency or catastrophic conditions would help make the City’s delivery system more reliable should the SWP/NBA water system be shutdown for long periods of time.

Vallejo has a robust supply of permit water and additional permit water could be made available to the City if Vallejo determines it has an adequate supply to meet its own needs. Vallejo is currently reviewing its water supply and also determining whether it can secure a water supply from Lake Curry. If the Lake Curry water supply becomes available to Vallejo, Vallejo may be more willing to sell some of its permit water. Because permit water is less prone to curtailment than SWP water, the City will likely enter into discussions with Vallejo for purchase of additional permit water.

While the City currently has an agreement with Vallejo to purchase additional treated water, the one-time connection fee and the ongoing service charges are high and would cause the water customers of new development, the recipients of this new water supply, to pay much higher water service charges than what would be charged to water customers in the existing neighborhoods of the City. To prevent this imbalance of service charges within the City, the City could try to negotiate a different connection fee and reduce the service charge for Vallejo treated water customers. The net effect would be that the City would pay the actual cost of service that Vallejo would incur by passing the connection fees to the new development, but keep the service charge of the future residents of this new water source the same as the rest of the American Canyon residents. Furthermore, if additional raw water from Vallejo becomes available, as discussed in the previous paragraph, the City could renegotiate to receive some or all of its Vallejo treated water supply as Vallejo raw water supply to reduce the City’s operating costs.

City of Rio Vista

On August 3, 2005, City representatives met with the City of Rio Vista (Rio Vista) Public Works Director to discuss the possibility of purchasing Rio Vista’s Table A allotment of SWP water. Currently, Rio Vista has a Table A allotment of 300 acre-feet per year commencing in 2016 and increasing annually to its ultimate allotment of 1,500 acre-feet per year in 2020. Because Rio Vista does not have the physical infrastructure needed to convey the water from the Cordelia Forebay (the location of the SWP/NBA water turnout for Solano County member units, including Rio Vista) or to treat the water, it is a good possibility that Rio Vista would be willing to sell its future supply.

City of Dixon

Discussions with the City of Dixon (Dixon) Public Works Director have also occurred regarding the possibility of purchasing Dixon's Table A allotment of SWP water. Like Rio Vista, Dixon has a Table A allotment of 300 acre-feet per year commencing 2016 and increasing annually to its ultimate allotment of 1,500 acre-feet per year in 2020. Also like Rio Vista, Dixon does not have the infrastructure to convey or treat SWP water. However, Dixon is in discussion with the Solano Irrigation District (SID) regarding the possibility of SID treating and delivering the SWP supply to Dixon. Nevertheless, it is still a possibility that SID will not be able to provide this service and Dixon's SWP water can then be made available to others, including American Canyon.

Groundwater

As part of the planning for future water supply, a preliminary groundwater analysis was completed to consider the potential for groundwater as a source of water. The analysis concluded that shallow groundwater beneath the City valley floor is derived from mostly older alluvial floodplain and fan deposits. Almost all of the wells in the area within and surrounding American Canyon have constructed wells within the alluvium, at depths up to 200 feet deep. These wells produce up to approximately 45 gallons per minute (gpm), with some not reliable in the dry months of the year. The few wells that have been installed deeper than this, to approximately 400 feet deep and in various types of fractured bedrock, have been found to be brackish and not sustainable. The City will continue to explore all groundwater possibilities over the next few years.

4.4 Reliability of Supply

State Water Project

The large majority of water that the City receives is from the SWP. The DWR issued a notice to the SWP contractors entitled *SWP Delivery Reliability Data* from the Draft 2005 SWP Delivery Reliability Report dated May 25, 2005 ("DWR reliability report"). The reliability analysis included in this UWMP is based on the 2005 DWR reliability report for the SWP water.³ Please see Appendix F for a copy of the DWR notice to contractors.

DWR last issued a reliability report for SWP delivery in 2003. Currently, DWR is preparing an update to the report, but the final report was not available at the time of preparation of this UWMP. In order to provide information to SWP water contractors for use in their preparation of their UWMPs, DWR issued relevant sections from their working draft of their upcoming 2005 reliability report in a notice to SWP contractors dated May 25, 2005. The DWR reliability report sections included seven studies used to estimate future water delivery reliability for the SWP, given assumptions and factors for the Sacramento and San Joaquin river basin precipitation; water rights and uses; SWP storage and conveyance facilities diversion facilities in the Delta; SWP service area demand; contractual provisions; and coordinating operations with the federal Central Valley Project (CVP).

³ The Draft 2050 Napa Valley Water Resources Study bases its reliability analysis on the 2003 DWR reliability report, an earlier report.

The DWR reliability report is a model of what SWP deliveries could be underestimated and also gives projected water demands. Study 6 of the report uses a level of development projected for 2005.⁴ Study 7 uses a level of development projected for 2025.⁵ The model uses historical hydrologic conditions from 1922 through 1994 to “predict” SWP deliveries under the actual hydrologic conditions for each year during the study period. The model’s predicted SWP delivery is shown as “percent of full Table A” in the model study results. It is important to note that “percent of full Table A” may not necessarily be the same as “percent of SWP request.” What is important for the City to know is the latter amount; that is, the percent of SWP water requested that the City can expect to receive under certain hydrologic conditions.

Reliability of Vallejo Supply

The City has additional water supplies from Vallejo. The City receives permit water from Vallejo which, although conveyed via the NBA system, is not SWP water. Permit water is a pre-1914 appropriative water right that Vallejo has under a license with the DWR. According to Vallejo representatives, permit water is not subject to the same curtailment conditions as the SWP. Historically, Vallejo has never experienced a curtailment of its permit water allocation, even under severe drought conditions. The reduction in permit water to American Canyon by Vallejo is tied to the same reduction that Vallejo citizens would be subject to.

Another key water supply is Vallejo treated water supply. Under the terms of its agreement with Vallejo, American Canyon’s delivery of treated water would be cut at the same level as Vallejo residents under a drought condition. To date, Vallejo citizens have never experienced a “water rationing” condition because Vallejo has had adequate supplies even during historical drought conditions.

Another water supply is Vallejo raw water emergency supply. This emergency supply of water is available to American Canyon only when its SWP supply is curtailed. In other words, this supply is only available when American Canyon receives less than its requested SWP supply in any given water year. The source is either permit water or SWP water that is conveyed via the NBA system.

Although Vallejo has not historically experienced mandatory water use reductions, it is reasonable to expect that Vallejo would impose some water use restrictions during drought conditions. Based on discussions with Vallejo water representatives, a reduction of 10% under drought conditions is a reasonable estimate to use. Under normal year conditions, American Canyon can expect to receive 100% of its contract amount. The 10% reduction is reasonable considering Vallejo’s main water supply source is Solano Project water. Under single dry and multiple dry year conditions, Solano Project water curtailment is projected to be less than 10%.

⁴ Study 6 in the DWR reliability report is actually based on 2001 levels of development but for purposes of preparing the 2005 UWMPs, Study 6 is used to represent 2005 levels. Refer to DWR report reliability for a detailed explanation.

⁵ Study 7 in the DWR reliability report is actually based on a projected 2020 level of development but for purposes of preparation of 2005 UWMPs, Study 7 is used to represent 2025 levels. Refer to DWR report reliability for detailed explanation.

Reliability of Recycled Water Supply

Under dry year conditions, it is estimated that the recycled water supply from both the City's treatment plant and from the Napa Sanitation District would be reduced by 10% due to increased indoor water conservation that is expected to occur during drought years. It is estimated that higher water use reductions would occur in outdoor water use (such as with irrigation) but this would not affect the amount of recycled water produced.

Reliability of Supplies for Normal Water Year

Tables 4-3 and 4-4 show the estimated water supply deliveries from the City's various sources of water for a normal water year in percent of total water supply and AFY. The supply deliveries for the SWP are as shown in the DWR reliability report. The percentages shown for a normal year are conservative estimates and do not take into consideration any surplus SWP water that is typically available during wet and normal years (commonly known as "Article 21" water). Historically, the City has typically received 90 to 100% of its Table A requests during wet and normal years.

Table 4-3
Estimated Normal Water Year Deliveries (%)

Year	2005	2010	2015	2020	2025
SWP Supply ^a	69%	71%	73%	75%	77%
Other Sources/Supplies					
Vallejo Permit Water	100%	100%	100%	100%	100%
Vallejo Treated Water	100%	100%	100%	100%	100%
Vallejo Raw Water	100%	100%	100%	100%	100%
City Recycled Water	100%	100%	100%	100%	100%
Napa San Recycled Water	100%	100%	100%	100%	100%

^a From Table 6-5 of DWR reliability report Memorandum No. 05-08 dated May 25, 2005.

Table 4-4
Normal Water Year Supply (AFY)

Year	2005	2010	2015	2020	2025
SWP Supply ^a	3,243	3,515	3,796	3,900	4,004
Other Sources/Supplies ^b					
Vallejo Permit Water	500	500	500	500	500
Vallejo Treated Water	629	1,352	2,075	2,641	3,207
Vallejo Raw Water	500	500	500	500	500
City Recycled Water ^c	107	858	858	858	858
Napa San Recycled Water	0	75	150	226	226
Total	4,979	6,800	7,879	8,625	9,295

^a SWP supply for normal years based on DWR reliability report Memorandum No. 05-08 dated May 25, 2005.

^b Other sources and supply amounts are shown in Table 4-2.

^c American Canyon Recycled Water Implementation Plan, September 22, 2005, Winzler & Kelly Consulting Engineers, Inc.

Reliability of Supplies for Single Dry Year

Table 4-5 shows the estimated water supply deliveries from the City's various sources of water for single dry year conditions. The SWP supply is based on the DWR reliability report, but also includes additional SWP carryover water. The DWR report uses 1977 as the basis for the single dry year analysis. Based on Table 6-5 of the DWR reliability report, the estimated deliveries

under the 1977 condition are 4% of full Table A for 2010, 2015 and 2020, and 5% for 2025. However, according to DWR representatives, there was storage available for use in the SWP system under the 1975/1976/1977 hydrologic conditions. The year 1975 was a wet year followed by a normal to dry 1976. During those years, there was water stored in the various SWP reservoirs that could be made available to water contractors. The Study 7 model results show a 76% delivery to its water contractors. The City did not receive the balance of its Table A amount and could have kept that in storage under the terms of Article 12(e) and Article 56 of the SWP water contract. The limitation is that the City would be required to use that carryover amount during the first three months of the calendar year. Therefore, in this analysis, it is assumed that carryover water equaling 24% of full Table A could be made available to the City.

Table 4-5
Estimated Single Dry Year Deliveries (%)

Year	2005	2010	2015	2020	2025
SWP supply ^a	4%	4%	4%	4%	5%
SWP carryover ^b	24%	24%	24%	24%	24%
Other Sources/Supplies ^c					
Vallejo Permit Water	90%	90%	90%	90%	90%
Vallejo Treated Water	90%	90%	90%	90%	90%
Vallejo Raw Water	90%	90%	90%	90%	90%
City Recycled water	90%	90%	90%	90%	90%
Napa San Recycled Water	90%	90%	90%	90%	90%

^a From Table 6-5 of DWR reliability report Memorandum No. 05-08 dated May 25, 2005.

^b Carryover water available from SWP reservoirs.

^c Vallejo water cut back same level as Vallejo water customers. Recycled water cut back based on sewer flow reduction resulting from indoor water conservation that would occur during drought conditions.

Table 4-6 is the estimated single dry year supply using the delivery figures shown in Table 4-5. The SWP supply is based on the DWR reliability report as well as carryover (storage) water availability. Ninety percent availability and delivery of other sources and supplies is assumed under single dry year conditions.

Table 4-6
Single Dry Year Supply (AFY)

Year	2005	2010	2015	2020	2025
SWP Supply ^a	1,316	1,386	1,456	1,456	1,508
Other Sources/Supplies ^b					
Vallejo Permit Water	450	450	450	450	450
Vallejo Treated Water	566	1,217	1,868	2,377	2,886
Vallejo Raw Water	450	450	450	450	450
City Recycled Water ^c	96	772	772	772	772
Napa San Recycled Water	0	68	135	203	203
Total	2,878	4,343	5,131	5,708	6,269

^a Includes SWP carryover.

^b Other sources and supply amounts are shown in Table 4-2.

^c American Canyon Recycled Water Implementation Plan, September 22, 2005, Winzler & Kelly Consulting Engineers, Inc.

Reliability of Supplies for Multiple Dry Years

Table 4-7 shows the estimated percent of full water supply deliveries that can be expected from the City's various sources of water for a multiple dry year condition. The Act requires a minimum 3-year multiple dry year analysis. The driest 3-year period of record was 1990 through

1992. The SWP supply is based on Study 7 of the DWR reliability report, which showed an average delivery of 38% of full Table A for multiple dry year conditions.

Table 4-7
Estimated Multiple Dry Year Deliveries (%)

Year	2005	2010	2015	2020	2025
SWP Supply ^a	38%	38%	38%	38%	38%
Other Sources/Supplies					
Vallejo Permit Water	90%	90%	90%	90%	90%
Vallejo Treated Water	90%	90%	90%	90%	90%
Vallejo Raw Water	90%	90%	90%	90%	90%
City Recycled Water	90%	90%	90%	90%	90%
Napa San Recycled Water	90%	90%	90%	90%	90%

^a From Table 6-5 of DWR reliability report Memorandum No. 05-08 dated May 25, 2005.

Table 4-8 shows the estimated water supply for multiple dry year conditions in AFY. Ninety percent availability and delivery of other sources is assumed under multiple dry year conditions.

Table 4-8
Multiple Dry Year Supply (AFY)

Year	2005	2010	2015	2020	2025
SWP Supply ^a	1786	1,881	1,976	1,976	1,976
Other Sources/Supplies					
Vallejo Permit Water	450	450	450	450	450
Vallejo Treated Water	566	1,217	1,868	2,377	2,886
Vallejo Raw Water	450	450	450	450	450
City Recycled Water	96	772	772	772	772
Napa San Recycled Water	0	68	135	203	203
Total	3,348	4,838	5,651	6,228	6,737

^a SWP supply for multiple dry water year is defined as 38% of SWP contract amount. Full contract amounts for the various water supplies are shown in Table 4-2.

4.5 Factors Resulting in Inconsistency of Supply

The City has considered specific climatic, water quality, environmental, and legal factors that could cause its water supplies to not be available at a consistent level of use. A discussion of each of these factors is provided below.

Climatic Factors

Of all of the City's existing water supplies, the SWP water supply is the most vulnerable to climatic conditions that affect hydrologic conditions and the delivery of the supply. The DWR reliability report states that assumptions and factors for the SWP concern, in particular, Sacramento and San Joaquin river basin precipitation. A comparison of the City's projected water supplies and demands during single dry year and multiple dry year conditions show that the City would need to compensate for its reduced SWP water supply allocation by maximizing the use of its Vallejo water supplies in conjunction with aggressive implementation of the City's Water Shortage Contingency Plan (see Section 9). It is also important that the City implement a long-term water strategy that relies less on SWP water, especially during drought conditions.

The Vallejo water supplies are very reliable. Even under severe drought conditions, Vallejo has never experienced a curtailment of its Permit Water allocation, nor has it had to require a “water rationing” condition of treated water. Based on discussions with Vallejo water representatives, a reduction of 10% under drought conditions is considered a reasonable estimate for the Permit Water, emergency raw water, and the treated water supplies.

The City is currently exploring other potential water supply purchases to provide water supply reliability during drought conditions. Because the SWP water supply is subject to curtailment even during normal water year conditions, it may be prudent to purchase additional SWP water entitlements in order to obtain a net 100% delivery, rather than the 75% delivery that is estimated to occur even during normal water years.⁶

Water Quality Factors

The main source of the water that the City receives from the SWP and Vallejo is from the Barker Slough watershed. This watershed is located in the larger Sacramento River watershed, and is approximately 30 square miles in area. In addition to the Barker Slough watershed, a portion of the treated water supply that the City receives from Vallejo comes from the Solano Project, which is water stored in Lake Berryessa.

The City’s SWP water and Vallejo permit water are delivered to the American Canyon Water Treatment Plant through the NBA. The *treated* water that the City receives from Vallejo is delivered through an intertie connection following treatment of the water at Vallejo’s Fleming Hill Water Treatment Plant. The source of the Vallejo treated water is Lake Berryessa and the Barker Slough watershed. The source water for the Vallejo treated water is conveyed to Vallejo by a separate pipeline from the Cordelia Forebay.

The City consistently meets all drinking water standards, though the source water occasionally poses treatment challenges during storm events when elevated levels of turbidity and total organic carbon (TOC) occur. Previous water quality investigations and assessments of the Barker Slough watershed have concluded that the primary contaminant sources are cattle and sheep that graze a large percentage of the watershed, as well as animals that have direct access to Barker Slough. During storm events, runoff from grazed lands and erosion of creek banks, combined with other sources in the watershed, result in high levels of turbidity and TOC in the source waters.

In order to reduce the significance of the potential contamination sources, the cities receiving NBA water have been working with Napa Flood and the Solano County Water Agency to evaluate watershed management practices that could improve water quality.

All California Department of Health Services (CDHS) standards are consistently met. The City exceeded the US EPA’s allowable levels of Total Trihalomethanes (TTHMs) in the second quarter of 2005. Measures have been taken by the City to lower these levels. Currently, the

⁶ See Table 4-2. It is estimated that in year 2020, during normal water year conditions, the SWP supply delivery is 75%.

second quarter 2005 running averages are well below the maximum contaminant level, and the City is in compliance with CDHS standards for TTHMs.

An inconsistency in the use of these water supplies due to water quality issues is considered to be unlikely.

Environmental Factors

The Sacramento-San Joaquin Delta (Delta) is the hub of the State's water distribution system. About two-thirds of all Californians and millions of acres of irrigated farmland rely on the Delta for water from the SWP and the Central Valley Project (CVP). The Delta is also a rich and productive habitat for more than 500 species of wildlife. The Delta's unique ecosystem supports 20 endangered species, including the Delta smelt, and serves as a vital migration pathway for salmon traveling to and from their home streams to the Pacific Ocean.

The U.S. Bureau of Reclamation operates the federal CVP, while DWR operates the SWP. Coordination of CVP and SWP operation is encouraged in the Delta Accord, the December 1994 agreement among State and Federal agencies and environmental and water-user groups regarding Delta water use and quality.

One aspect of the agreement requires State and Federal system operators to moderate water exports when a certain number of Delta smelt are detected at the pumps that export water from the Delta. The Delta smelt, tiny fish which inhabit the Delta, are currently listed as "threatened" under the Endangered Species Act. Protection of the Delta smelt includes adjusting pumping rates to help protect the fish populations. These restrictions on pumping are not expected to have any major near-term impacts on water supplies to the NBA.

On July 30, 2004, the U.S. Fish and Wildlife Service issued a biological opinion finding that the revised Operating Criteria and Plan (OCAP) for the jointly operated CVP and SWP posed no jeopardy to the federally listed Delta smelt. Several coalitions have filed suit in federal court against the Fish and Wildlife Service challenging the biological opinion.

Legal Factors

The water supply that the City receives from the SWP is contracted through Napa Flood. The contract covers the supply of water from the NBA to the City throughout the term of the State contract. The term of the NBA contract between the City and Napa Flood is the same term as between Napa Flood and the State of California, which is 2038. The water contract may be extended after that time. The water contracts between the City and Vallejo have no expiration date.

4.6 Transfer and Exchange Opportunities

This section describes the City's existing transfer and exchange opportunities for short-term and long-term water exchange and transfer. The City has one existing transfer and exchange opportunity, and two agreements for supplemental water supply for emergency purposes. A description of each of these is provided below.

Addendum 1 of the Vallejo Water Agreement

On July 18, 1996, the Vallejo Water Agreement was amended (Addendum 1) to provide for the City's purchase of up to 500 acre-feet of water per year for emergency purposes. Under Addendum 1, an emergency is defined as a condition whereby the City's SWP/NBA water supply is reduced due to environmental or other constraints. Under "normal" years where the City's Table A allotment is not curtailed, emergency water is not available for purchase.

Addendum 4 of the Vallejo Water Agreement

On December 7, 2000, the Vallejo Water Agreement was amended (Addendum 4) to provide for a three-party agreement for the exchange of water between American Canyon, Vallejo, and Yountville. The exchange involved American Canyon transferring 250 acre-feet of its SWP Table A entitlement to Yountville in exchange for 250 acre-feet of Permit Water from Vallejo. The terms of the agreement were set to expire within 5-years (December 7, 2005). The agreement requires specific pre-conditions that must be met for the exchange to occur. It is anticipated that the Yountville exchange will not occur because contractual pre-conditions will not be met by the term's expiration.

Napa (Informal Mutual Agreement)

The City has an informal mutual agreement with Napa to purchase treated water from Napa for emergency purposes. The amount of treated water that the City purchases from Napa is counted against American Canyon's SWP Table A allotment. As such, this source is not considered an additional supply, but does provide operational flexibility for the City.

Section 5.0 Water Demand

5.1 Introduction

This section of the UWMP presents the actual and projected number of water accounts and annual water use at 5-year increments between 2000 and 2025. These are presented in Tables 5-1 and 5-2.

5.2 Current and Future Demands

Table 5-1 below presents actual and projected numbers of customer accounts by land use designation. The number of customers is approximate and was not used to estimate the water demands presented later in this Section.

Table 5-1
Past, Current, and Projected Accounts By Land Use Designation

Customer Type	Number of Accounts					
	2000	2005 ^c	2010	2015	2020	2025
Agriculture	5	8	14	14	14	15
Community Commercial	69	109	120	131	134	138
Commercial Neighborhood	5	11	14	17	17	18
Commercial Recreation ^a	1	1	2	3	3	3
Industrial	89	117	245	372	381	391
Open Space	7	6	6	6	6	6
Public	4	6	8	9	9	9
Residential High	2	103	610	1,116	1,144	1,172
Residential Medium	300	497	715	933	956	980
Residential Low	2,344	4,300	4,578	4,856	4,977	5,102
Residential Estate	6	12	21	59	60	62
Other ^b	251	322	322	322	330	338
Total	3,083	5,491	6,655	7,838	8,031	8,234

^a Includes projected park areas.

^b Includes parcels outside of the Traffic Area Zoning land use map.

^c Based on 2004 and 2005 data.

Past Demands

Customer water demands for the year 2000, as presented in Table 5-2, were obtained from actual billing data, and applied to land use designations.

Current Demands

Customer demands for the year 2005 are based on actual billing data from October 2004 through September 2005. Billing data was then sorted by land use designation. Table 5-2 below presents actual and projected water use in acre-feet per year according to land use designation.

Table 5-2
Past, Current, and Projected Water Use By Land Use Designation

Customer Type	Water Demand (AFY)					
	2000	2005 ^d	2010	2015	2020	2025
Agriculture ^a	1	205	521	521	534	547
Community Commercial	52	64	179	294	301	309
Commercial Neighborhood	6	25	33	40	41	42
Commercial Recreation ^b	0	8	115	222	228	233
Industrial	335	648	1,285	1,922	1,970	2,019
Open Space	10	7	7	7	7	7
Public	44	79	108	137	140	144
Residential High	12	37	157	276	283	290
Residential Medium	171	334	386	439	450	461
Residential Low	732	1,600	1,689	1,778	1,822	1,868
Residential Estate	2	8	17	26	27	27
Other ^c	902	418	418	418	429	440
Total	2,265	3,432	4,959	6,080	6,232	6,387

^a Includes both potable water and raw water use on parcels designated agriculture (primarily vineyards).

^b Includes projected park areas.

^c Includes parcels outside of the Traffic Area Zoning land use map and water use that was not specifically assigned.

^d Based on October 2004 through September 2005 billing data.

Future Demand Projections

In developing the water demand projections beyond the current year several assumptions were made including the following:

- Buildout will occur in accordance with the current Napa County and City of American Canyon General Plans;
- Buildout will be reached by 2015 and growth will be uniform from 2004 through 2015;
- Incremental growth will occur beyond buildout at an annual rate of 0.5%;
- Future water demands by land use type will be consistent with historical water use in the City between 2000 and 2004; and
- Irrigation demands for vineyards within the water service area will be consistent with projections in the City's Recycled Water Implementation Plan (2005) and Recycled Water Facilities Plan (2003).

It is recognized that the City and County are beginning the process of updating their General Plans. The General Plan updates could include revisions that might impact water demand projections developed for this UWMP. However, the Act requires that the City complete the UWMP in 2005 and therefore the assumptions used in developing future water demands need to be based on the best available information. The water demand projections summarized in this UWMP can be used as guidance for the General Plan update processes, and the 2010 UWMP will take into account revisions made to the City and County General Plans at that time.

Future water demand projections were developed for three categories within the City water service area:

- Growth within the City's sphere of influence (non-vineyard)

- Growth outside the City's sphere of influence (non-vineyard)
- Potential vineyard irrigation

The future demand projections are based on water billing data through 2004, and are applied at a uniform rate from 2005 through 2015. Appendix G of the UWMP provides the methodology and states assumptions used in developing the water demand projections for this UWMP.

Future Demands Within City Sphere of Influence (Non-Vineyard)

Future demands within the City's sphere of influence are consistent with the City's General Plan. Potential development scenarios were estimated by the City and used as the basis to project water demands under buildout conditions and although the majority of the developments are not approved as of this time, the scenarios are reliable for the purposes of completing the UWMP. Using the unit demand factors described in Appendix G, future water demands for proposed developments are as follows:

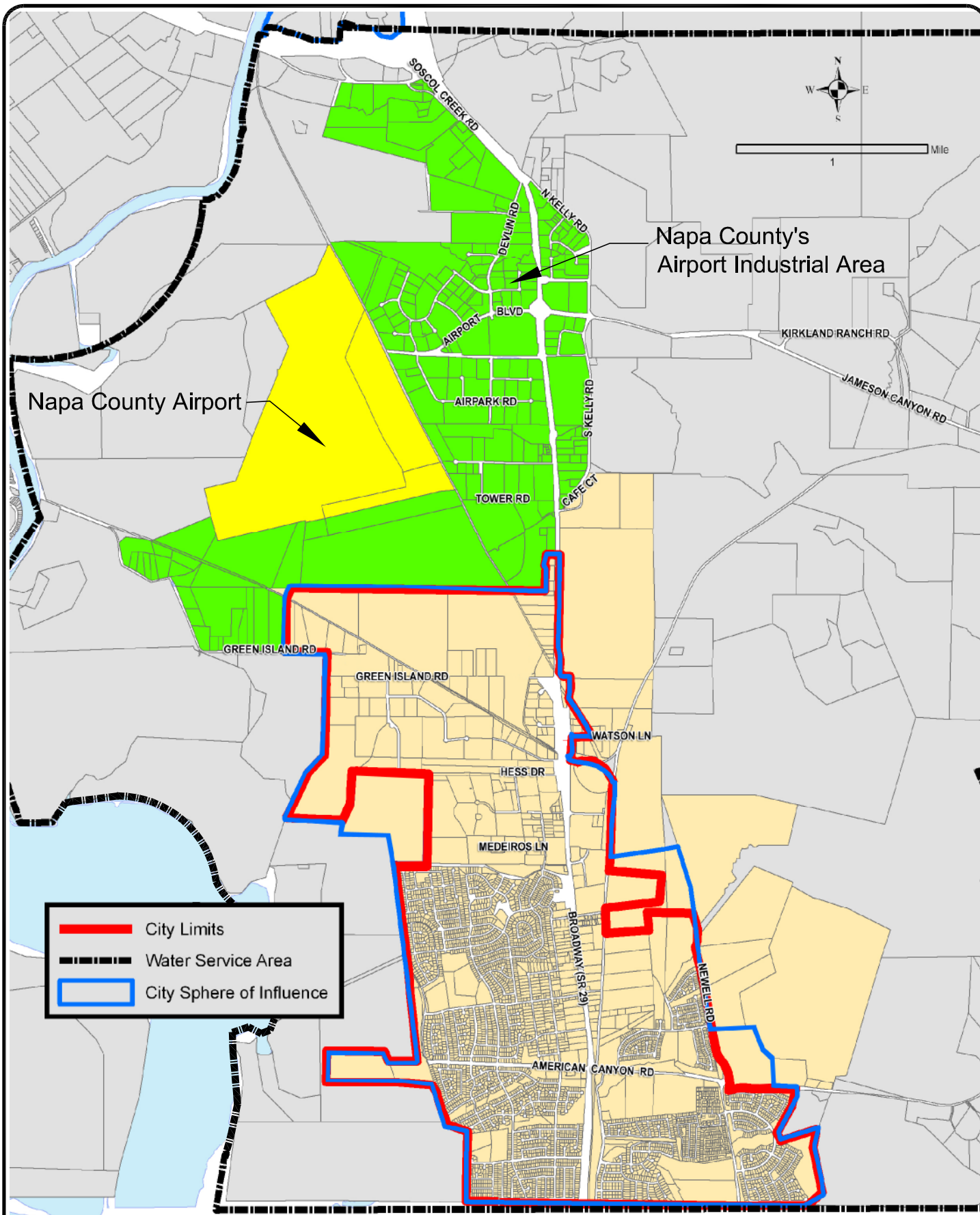
Oat Hill Partners/ Eucalyptus Grove	195 AFY
Town Center	289 AFY
Green Island Road Annexation	199 AFY
Green Island Industrial Park	49 AFY
Vintage Ranch	192 AFY
<u>Other Developments</u>	<u>566 AFY</u>
Total	1,490 AFY

The Vintage Ranch development is included as a future demand because, although it had been approved by the City, it was not generating demands at the end of 2004.

Future Demands Outside City Sphere of Influence (Non-Vineyard)

The future demands outside of the City's sphere of influence (non vineyard) are primarily generated from the industrial area between the Napa County Airport and Kelly Road, north of the City. The airfield itself (622 acres) has an existing demand of 15 AFY and that is not expected to change significantly in the future. The remaining area in the County's Airport Industrial Area (1,722 acres) is zoned Industrial and has an existing demand of 354 AFY. Assuming that this area has a potential water demand of 650 gpd per gross acre, the ultimate buildout demand for this area is 1,254 AFY of which the future demand is 900 AFY. The total buildout demand outside the City's sphere of influence (non-vineyard), including existing demands, is 1,268 AFY. Figure 5-1 shows the airfield and industrial areas outside the City's sphere of influence.

The proposed Montalcino Resort is included within the County's Airport Industrial Area as shown in Figure 5-1, except for the golf course. The Montalcino Resort will be located on 68 acres that is subject to a maximum demand of 650 gpd per acre. The proposed project requires more water than the maximum allowable and the City will require them to purchase additional land zoned Industrial and leave it undeveloped in order to meet the water demands. Therefore,



Not to Scale

FIGURE 5-1
WATER DEMANDS
OUTSIDE THE CITY'S
SPHERE OF INFLUENCE

this entire demand is included in the estimated future demands for outside the City's sphere of influence. The golf course will be irrigated with recycled water from Napa Sanitation District. Since the golf course is not zoned Industrial, it was not included in the estimated future water demands.

Vineyard Demands

The Recycled Water Implementation Plan and Recycled Water Facilities Plan identify existing vineyards that are City water customers and that currently use raw water. Their total demand is 153,000 gallons per day or 171 AFY. As the recycled water infrastructure is built and the recycled water plan is implemented, the City anticipates that this water demand will be supplied by recycled water. This is expected to occur by the year 2010.

Additionally, several other vineyards that do not currently use City water for irrigation are targeted for recycled water use by 2010. They total an estimated demand of 347 AFY. The total projected vineyard demand within the City's water service area is 518 AFY.

5.3 Sales to Other Agencies

The City does not currently sell water to other agencies, nor does it plan to do so in the foreseeable future.

5.4 Additional Water Uses and Losses

When comparing raw water use to customer meter readings, the City has found that approximately 10% of the City's supply water is un-metered. This differential between water supply and metered water use includes system flushing, leak repair flushing, hydrant leaks, street sweeping, and known leaks that are subsequently repaired. The remainder is "unaccounted-for water," that is, unmetered and/or water leaking from the system. The City is committed to minimizing its unaccounted-for water and staying within industry averages for a system of its size. Table 5-3 below presents average water losses and unmetered uses for the year 2000 and projections for 5-year increments through 2025.

Table 5-3
Additional Water Uses and Losses

Year	Water Demand (AFY)					
	2000	2005	2010	2015	2020	2025
Total Unmetered Uses, Known Leaks, and Unaccounted-for Water	227	343	496	608	623	639

Total Water Use

Table 5-4 summarizes the City's total past, current, and projected water demands as determined in Sections 5.1 through 5.4. The amounts presented in this table will be used in the comparison of supplies and demands in this UWMP.

Table 5-4
Total Water Demand

Demand Type	Water Demand (AFY)					
	2000	2005 ^a	2010	2015	2020	2025
Customer Demand	2,265	3,432	4,959	6,080	6,232	6,387
Sales to Other Agencies	0	0	0	0	0	0
Unmetered Uses and Losses	227	343	496	608	623	639
Total	2,492	3,775	5,455	6,688	6,855	7,026

^a Estimated Water Use for City.

Table 5-4a
Total Water Demand

Demand Type	Water Demand (AFY)					
	2000 ^a	2005 ^b	2010	2015	2020	2025
Customer Demand Within City (non-vineyard)	1,963	2,769	3,530	4,291	4,398	4,508
Customer Demand Outside City (non-vineyard)	230	458	908	1,268	1,300	1,332
Vineyards	72	205	521	521	534	547
Sales to Other Agencies	0	0	0	0	0	0
Unmetered Uses and Losses	227	343	496	608	623	639
Total	2,492	3,775	5,455	6,688	6,855	7,026

^a Actual Water Use for City.

^b Estimated Water Use for City.

The City has in place an ordinance limiting future industrial water customers to a maximum demand of 650 gallons per day per acre. Industrial users needing more water will need to purchase additional land zoned as industrial to acquire the additional water needed. Pokka Beverages, a current industrial water user with a large water demand, has a pre-existing agreement for water service from the City that limits them to a maximum of 500 gpm at any time. They average about 120 gpm over a year (196 AFY) and their peak month usage was 491 gpm in August 2003. The majority of the future water demand in American Canyon is due to residential growth.

Section 6.0 Water Supply and Demand Comparisons

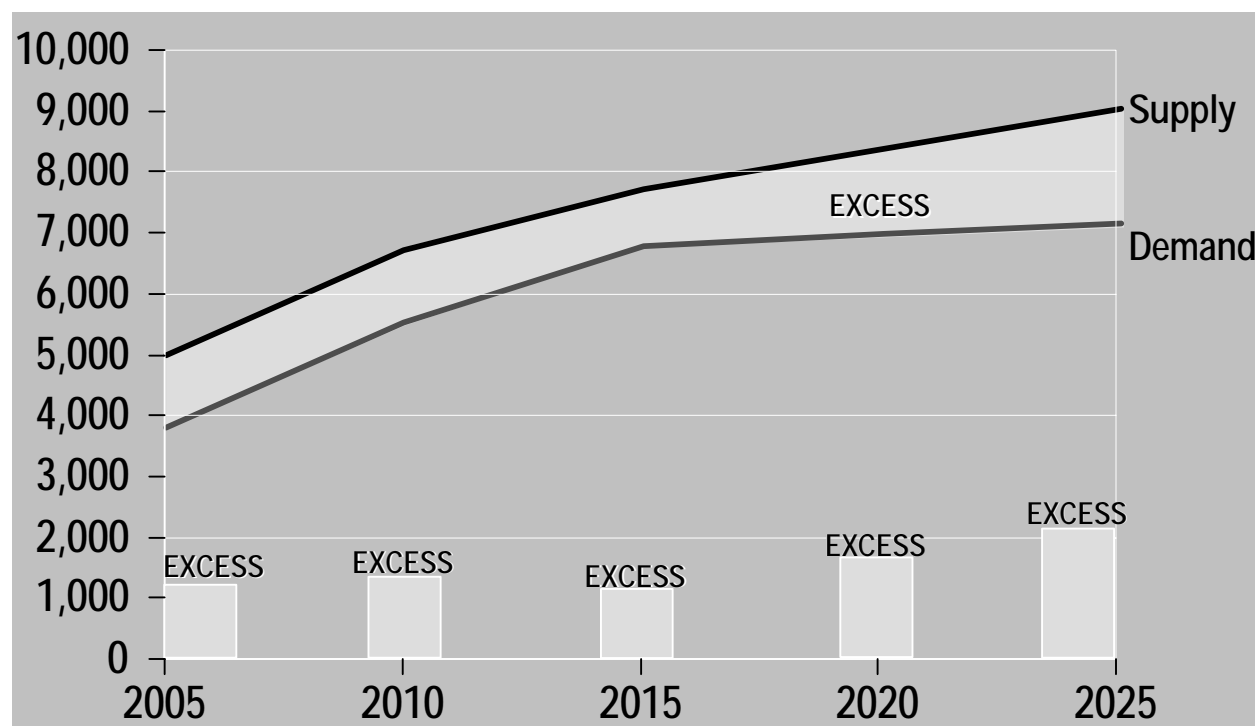
6.1 Projected Normal Water Year Supply and Demand

This section presents comparisons between projected water supplies and demands for normal, single dry, and multiple dry scenarios. Table 6-1 below presents projected normal year supply and demand comparisons and Graph 6-1 presents water supply and demand comparison in graphical form.

Table 6-1
Projected Normal Year Supply and Demand Comparison (AFY)

Year	2005	2010	2015	2020	2025
Total Projected Supply	4,979	6,800	7,879	8,625	9,295
Total Projected Demand	3,775	5,455	6,688	6,855	7,026
Difference (Supply minus Demand)	+1,204	+1,345	+1,191	+1,770	+2,269
Percent Difference (surplus or shortfall)	+32%	+25%	+18%	+26%	+32%

Graph 6-1
Projected Normal Year Supply and Demand Comparison



For normal water years, the City is projected to have a surplus water supply through 2025. The surplus percentages range from 18 to 32%.

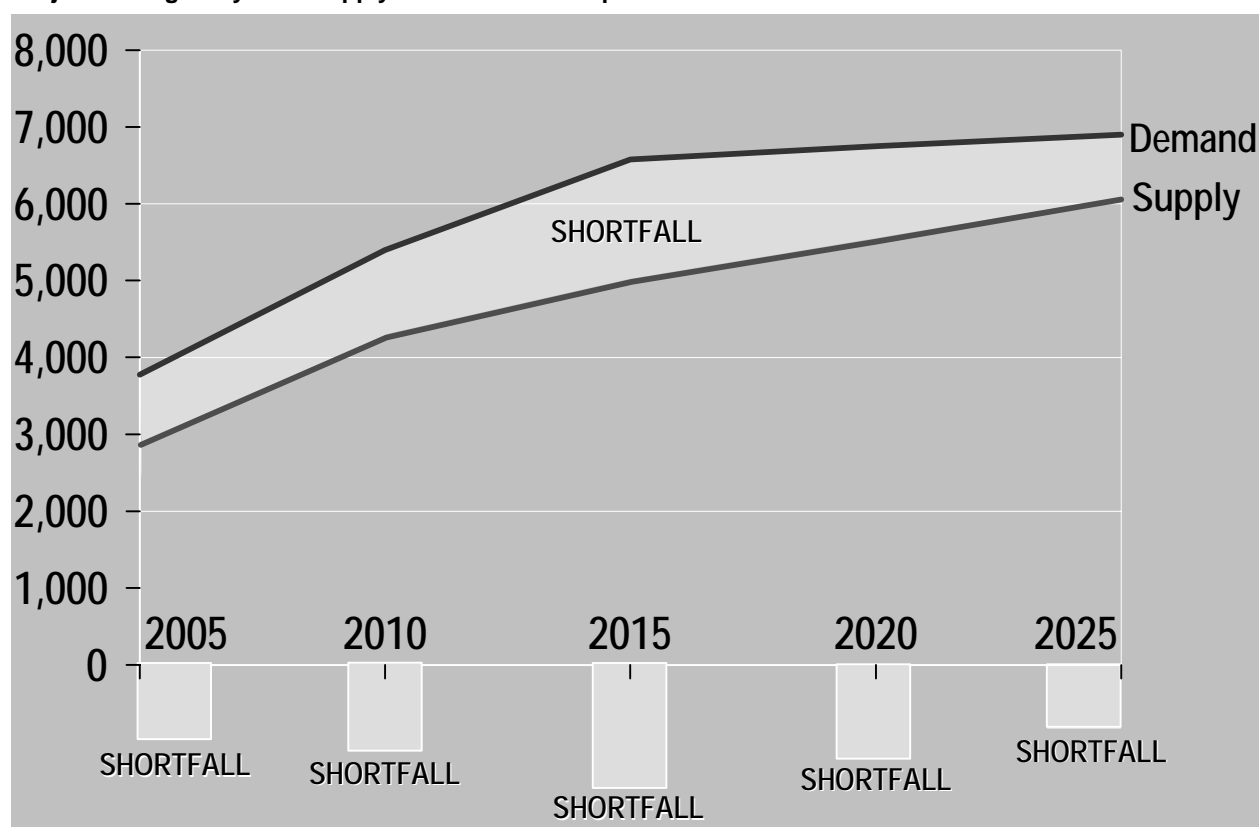
6.2 Projected Single Dry Year Supply and Demand Comparison

Table 6-2, presented below, presents projected water supply and demand comparisons from 2005 to 2025 in 5 year increments for a single dry year scenario. Graph 6-2 presents the single dry year supply and demand comparison graphically.

Table 6-2
Projected Single Dry Year Supply and Demand Comparison (AFY)

Year	2005	2010	2015	2020	2025
Total Projected Supply	2,878	4,343	5,131	5,708	6,269
Total Projected Demand	3,775	5,455	6,688	6,855	7,026
Difference (Supply minus Demand)	-897	-1,112	-1,557	-1,147	-757
Percent Difference	-24%	-20%	-23%	-17%	-11%

Graph 6-2
Projected Single Dry Year Supply and Demand Comparison



As Table 6-2 and Graph 6-2 illustrate, in the event the City faces a single dry year under the scenario explained in Section 5, there will be a shortfall of supply for all projected years (Graph 6-2). The shortfall would be approximately 24% in 2005 and would fall to approximately 12% in 2025 as water supplies increase in proportion to demand. In a single dry year, it would likely be necessary for the City to declare a Stage 2 or 3 water shortage encouraging water customers to implement water conservation measures.

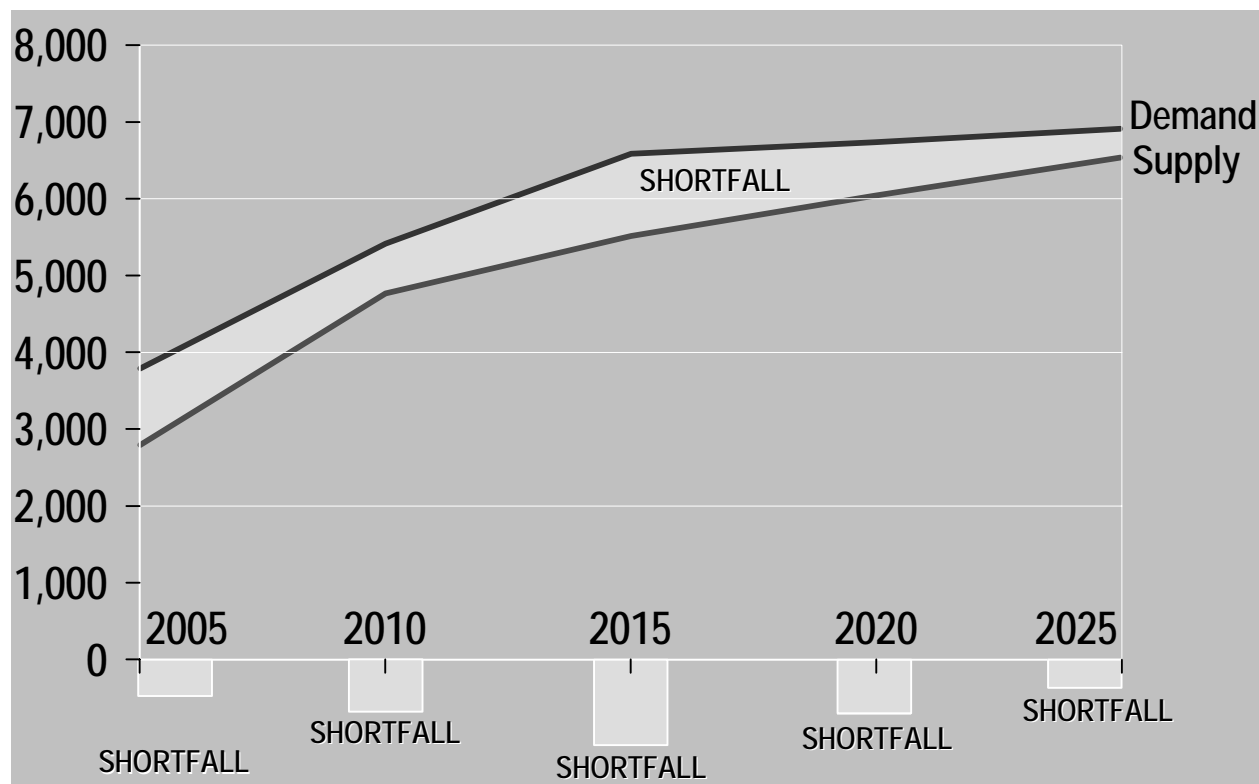
6.3 Projected Multiple Dry Year Supply and Demand Comparison

Table 6-3 and Graph 6-3, presented below, present projected water supply and demand comparisons from 2005 to 2025 in 5-year increments for a multiple dry year scenario.

Table 6-3
Projected Multiple Dry Year Supply and Demand Comparison (AFY)

Year	2005	2010	2015	2020	2025
Total Projected Supply	3,348	4,838	5,651	6,228	6,737
Total Projected Demand	3,775	5,455	6,688	6,855	7,026
Difference (Supply minus Demand)	-427	-617	-1037	-627	-289
Percent Difference	-11%	-11%	-16%	-9%	-4%

Graph 6-3
Projected Multiple Dry Year Supply and Demand Comparison



As in a single dry year scenario, it is projected that the City would experience a shortfall in water supply during a multiple dry year scenario, as explained in Section 5, for all projected years. When using multiple dry year projections, the shortfall in water supply is expected to be less severe than in the single dry year scenario. When the recycled water program is implemented and other supplies expanded, the shortfall decreases from 11% in 2005 to 4% in 2025. Water conservation measures would need to be implemented, however, declaring a Stage 3 water shortage would likely be avoided.

Section 7.0 Demand Management Measures

7.1 Introduction

By implementing water conservation program or “demand management measures,” the City can reduce overall water consumption. The City became a signatory to the California Urban Water Conservation Council’s (CUWCC) Memorandum of Understanding (MOU) in 1998 and agreed to implement Best Management Practices (BMPs) for water conservation⁷. Due to staffing shortages, the City has not been able to fully implement all of the CUWCC’s Demand Management Measures (DMMs) according to the schedule in the MOU. However, in June 2005, the City hired a new staff member to fill a newly created position. The staff person filling this position is tasked to spend 25% of her time on water conservation and is the designated water conservation coordinator.

Each year, each signatory to the CUWCC completes an annual report, updating the progress of each BMP. This is referred to as the BMP report. The latest BMP reports to the CUWCC, for the year 2004, are presented in Appendix H.

The City plans to implement all 13 applicable DMMs from the MOU by 2010⁸. This timeframe coincides with the due date of the next UWMP, which is December 2010. Though the City plans to implement all applicable DMMs within the next five years, the implementation schedules for each of the DMMs not yet implemented have not been determined, with the exception of DMM number 3, system audits and leak repair, described in Section 7.2 below. The water conservation coordinator and other key staff will prioritize the schedule for program development according to budgetary, staffing, and other relevant conditions over the course of the next five years. Descriptions of the DMMs are presented below.

7.2 Descriptions of Demand Management Measures

DMM 1 - Residential Water Use Surveys

This DMM includes entering into residential water customers’ homes to identify leaks as well as opportunities to save water. Commonly, surveys include checking toilets for leaks, checking for hidden leaks, offering or installing low-flow showerheads and faucet aerators, and checking landscape irrigation systems and controllers.

DMM 2 - Residential Plumbing Retrofit

The goal of this DMM is to have at least 75% of residences within the City’s water service fitted with low-flow showerheads. Until that 75% saturation rate is attained, low-flow devices such as showerheads, faucet aerators, and toilet tank dams must be distributed to or installed in no less than 10% of residential homes during each 2-year reporting period.

⁷ “Demand Management Measures” are referred to as “Best Management Practices” by the CUWCC. This UWMP will use the DWR term, Demand Management Measure.

⁸ There are a total of 14 BMPs in the CUWCC guidelines; the City will not be implementing BMP 10 as this BMP applies to water supply wholesalers. The Memorandum of Understanding can be viewed on the CUWCC website by going to www.cuwcc.org.

City residents can obtain low-flow showerheads and faucet aerators free-of-charge from the public works department and at public events. The numbers of devices distributed have not historically been recorded; however, City staff has begun tracking distribution of these devices for reporting purposes and will be able to report these numbers in future years.

DMM 3 - System Water Audits, Leak Detection and Repair

For compliance with DMM 3, water suppliers must annually calculate the percentage of water lost from the water distribution system and determine whether that loss is less than 10%. In the years that water loss is 10% or greater, water suppliers are to conduct a water system leak audit and repair the leaks found, as feasible.

City Public Works staff has isolated the section of water main that is the greatest cause of known water leaks. This is a 14-inch water main located north of the airport section, and it will remain abandoned. A 14-inch water main located south of the airport along Highway 29 has also been found to be a source of leaks. A budget and work plan are being developed for replacing this section of main. The City is considering implementing a leak detection program for its water system and has budgeted for such a program.

DMM 4 - Metering with Commodity Rates

Installation of water meters allows for the measurement of water consumed per customer account and is essential to water conservation. This DMM requires that all new connections be metered and that all metered accounts be billed by volume of use. For water suppliers who have accounts that are not metered, this DMM includes establishing a program for installing meters at existing connections. All of the City's water accounts are metered and billed based on volume of water used. Because aged meters do not capture water use accurately, the City replaces meters on a 12-year cycle.

DMM 5 - Large Landscape Irrigation Efficiency

Water suppliers must provide support to non-residential customers with large landscapes to improve the efficiency of their irrigation. Some voluntary elements of this DMM include installing dedicated irrigation meters at non-residential accounts and installing climate-appropriate landscaping at agency-owned properties.

In the year 2000, the City began a dedicated irrigation meter retrofit program. In the year 1999, there were no dedicated irrigation meters in the City's customer base. Currently there are more than 40 accounts that have been retrofitted with irrigation meters. The City will evaluate which of the many other options available for large landscape water conservation are appropriate for the City.

Although recycled water use for large landscapes is not strictly considered an element of this DMM, it does offset potable water use for large landscapes, and is therefore mentioned in this section. As will be discussed further in the recycled water section of the UWMP, the City's upgraded WWTP treats collected wastewater to a tertiary level, thereby making it usable for irrigation. As of July 2005, the City has begun delivering recycled water for irrigation.

DMM 6- Residential Clothes Washer Rebates

The purpose of this DMM is to encourage the purchase of high-efficiency clothes washers by providing rebates to water customers. The California state legislature has approved legislation that requires higher efficiency standards for residential clothes washers to take effect in 2007, with an increased standard to take effect in 2010. Because the federal government has jurisdiction over efficiency standards, the State legislature has petitioned the Federal government to accept the States' efficiency standards.⁹

The City is coordinating with Electric and Gas Industries Association (EGIA) to join an existing regional residential clothes washer rebate program.

DMM 7 - Public Outreach and Education

Signatories to the CUWCC MOU agree to promote water conservation by a variety of means such as direct mailers, Internet, public events, and placement of articles in local newspapers. The City maintains a website with water conservation suggestions and water saving facts. Additionally, the City has included water conservation information in utility bills and has distributed information at public events. The toilet retrofit program has been presented on the local community access television station. The City will continue these outreach activities, and will expand public outreach activities to correspond with expanded conservation programs.

DMM 8 - School Education

This DMM includes promoting water conservation through school programs. Education materials or lessons used must comply with state education framework requirements and must be geared to individual grade levels. The City may use readily available materials, or contract with educational programs already in place. The City currently includes water conservation messages in the storm water school programs. The program will be expanded to include more of an emphasis on water conservation.

DMM 9 - Conservation Programs for Commercial, Industrial, and Institutional Accounts

This DMM addresses indoor water conservation programs for non-residential water customers. Required elements include acceleration of the replacement of non-conserving toilets with ultra low-flush toilets. Additionally, the City must either conduct water use surveys, or by a variety of means including toilet replacement, achieve a total of 10% reduction in water use of non-residential sectors.

The City will evaluate which types of programs are most appropriate for implementation and will explore options for participating in regional programs. The City's toilet replacement program allows for businesses to participate, though the focus has been on residential customers. This program will be expanded to include a greater emphasis on non-residential toilet replacement.

⁹ Source: CUWCC website.

DMM 11 - Conservation Pricing

Conservation pricing consists of implementing water and sewer rates designed to recover the cost of providing service and based on volume of use rather than a flat rate. Additionally, one or more of the following must be implemented: the unit rate must be constant or increase as the quantity used increases, or seasonal rates or excess-use charges to reduce peak demands during summer months are levied, or rates will be charged based upon the long-term marginal cost of adding the next unit of capacity to the system. The City's sewer and water rates are charged uniformly and by volume. Also, the rates are designed to cover the cost of providing water and sewer service.

DMM 12 - Conservation Coordinator

The City's newly-created environmental specialist position was filled in June of 2005. This is a full-time position and calls for 25% of the staff person's time to be devoted to water conservation implementation. Among other duties, this environmental specialist is designated as the City's water conservation coordinator.

DMM 13 - Water Waste Prohibition

Implementation of this DMM consists of adopting and enforcing water waste prohibitions. The ordinance or other enforcement mechanism shall prohibit gutter-flooding, single pass cooling systems in new connections, non-recirculating systems in all new conveyer car wash and commercial laundry systems, and non-recycling decorative water fountains. The City plans to develop a water waste prohibition ordinance and appropriate enforcement mechanisms. It is estimated that the ordinance and enforcement plan will be in place within the next three to five years.

DMM 14 - Residential Toilet Replacement Program

All new toilets sold in California must be ultra low-flush toilets, which use a maximum of 1.6 gallons per flush. Because of this state legislation, toilets will be replaced over time with ultra low-flush models. Implementation of this DMM is intended to accelerate the replacement of non-conserving toilets to a faster pace than "natural replacement." Replacement programs can be either rebate programs or direct installation programs. Compliance with this DMM can also be achieved through implementing and enforcing an ordinance which requires the replacement of non-conserving toilets in homes when there is a change in home ownership.

The City has a toilet retrofit program in place to encourage replacement of high-flush toilets for both commercial and residential customers. The program provides for a City staff person to inspect the toilets that are being replaced to confirm that the existing toilet(s) are not already ultra low-flush toilets. Water customers deliver the old toilets to the City corporation yard to receive a \$100 credit per toilet on the customer's water bill. The program is advertised on the City website, in the local newspaper, at public events, and on the local community access channel. In the five years since the inception of the retrofit program, 267 toilets have been replaced.

7.3 Evaluation of Water Conservation Effectiveness

As a signatory to the CUWCC, the City will use the on-line BMP reporting and water savings calculation tools available to all CUWCC members. The City will track and record water conservation efforts and use standard methods of measuring water savings, as recommended by the CUWCC to measure the effectiveness of its programs and to estimate actual water savings.

Section 8.0 Water Supply Projects

8.1 Introduction

This section includes descriptions of water supply projects that may be undertaken by the City to meet total projected water use. In compliance with the Act, these descriptions include the projected amount of water that will be added to the water supply for each project when completed. Demand management measures are not included in this section.

8.2 Planned Water Supply Projects

Purchase Additional Vallejo Potable Water

The City has a contractual option to buy additional potable (treated) water supply from Vallejo. This option may be exercised at any time from the present through 2021.

Purchase Additional Vallejo Raw Water

The City is currently investigating the purchase of additional raw water from Vallejo. Based on initial discussions with Vallejo, Vallejo is not interested in selling raw water until it determines if water from its Lake Curry system is likely to become available. Negotiations will begin after the 2005 UWMPs for the two cities have been completed and accepted.

Purchase Entitlements from other Napa County Cities

The City is currently investigating the purchase of SWP water entitlements that can be wheeled through the NBA system. In addition, the City is investigating the purchase of water from Napa other County agencies. This project could also include short-term transfers and exchanges during drought years. These discussions will likely not begin in earnest until the affected cities have completed and accepted their UWMPs.

Recycled Water Distribution System

The recycled water project, described below and in Section 10, will offset potable water use for irrigation and industrial uses when complete. The recycled water infrastructure is partially constructed and is delivering recycled water to one customer. The project is scheduled to be complete by 2008.

Recycled Water Storage

Storage ponds for recycled water are scheduled to be completed in 2006. Storage ponds will allow for the collection of recycled water during the months at the beginning and end of the summer when irrigation demands are low so that the recycled water will be available for use during peak demand in the middle of the summer. The goal is to provide enough storage capacity to the recycled water system to prevent the need for potable water to supplement recycled water use for the recycled water customers. The total future storage capacity is yet to be determined but is currently estimated to be roughly 160 acre-feet.

Municipal Groundwater Wells

The City currently does not use groundwater as a source. Most wells in the City do not produce sustainable yields or they produce brackish groundwater. The City is currently evaluating the potential for groundwater resources available to the City. This work will be completed in 2006.

NBA Napa Terminal Tank

The City is supporting the improvements for the NBA system, such as the terminal tank. The tank is not seismically retrofitted and can only be filled to 5.3 million gallons. The Joint Powers Authority is constructing two new tanks that will provide 10 million gallons of water storage. This tank improvement is included in this section because it will improve the reliability of the NBA system even though it will not provide “additional” water supply. It is anticipated this project will be complete by the end of 2007.

Table 8-1 below summarizes the City’s planned water supply projects and the acre-feet per year of water supply estimated to be made available to the City from each. Many of the potential water supply projects listed in the table below are at stages too preliminary to estimate the volume the amount of water supply that would be made available.

**Table 8-1
Future Projects and Resulting Water Supply Made Available (AFY)**

Project Name	Normal Year	Single Dry	Multiple Dry Year 1	Multiple Dry Year 2	Multiple Dry Year 3
Purchase Additional Vallejo Potable Water	2,578	2,320	2,320	2,320	2,320
Purchase Additional Vallejo Raw Water	TBD	TBD	TBD	TBD	TBD
Purchase SWP Water from Napa County Cities	TBD	TBD	TBD	TBD	TBD
Recycled Water Distribution System	858	772	772	772	772
Recycled Water Storage	160	160	160	160	160
Municipal Groundwater Wells	0	0	0	0	0
NBA Terminal Tank	0	0	0	0	0

8.3 Development of Desalinated Water

The City is not currently investigating options for desalinating water.

8.4 Projects for Future Considerations

The City may seek to enter into an agreement with Napa Sanitary District to assist in their recycled water program in order to shorten the timeframe of completion of that agency’s recycled water project.

Section 9.0 Water Shortage Contingency Plan

9.1 Introduction

The Act requires a Water Shortage Contingency Plan to be prepared by water suppliers to address plans for responding to an emergency situation which reduces the supply of water available to the City. Conservation measures encouraged or required during an emergency shortage are temporary measures that last for the duration of the emergency shortage only. The UWMP requires water suppliers to consider several stages of action representing different levels of a water supply shortage. This plan addresses potential water supply reductions of 10, 20, 30, and 50%. Each of the stages is discussed below, with a draft ordinance presented in Appendix I.

9.2 Stages of Action

In the event of temporary impairments to the transmission system or water supply shortages, the City has four water conservation stages of action based on various levels of water supply shortages. Stage 1 is in response to a projected 10% shortage and calls for a voluntary reduction in water consumption by 10%. Stages 2, 3 and 4 include mandatory water conservation measures to address water shortages of 20, 30, and 50%, respectively. Due to the severity of Stage 4, this stage may include water rationing.

Table 9-1
Water Conservation Stages and Demand Reduction Goals (%)

Stage 1	Stage 2	Stage 3	Stage 4
Voluntary Conservation	Mandatory Conservation	Mandatory Conservation	Mandatory Conservation
10%	20%	30%	50%

9.3 Estimate of Minimum Supply for Next Three Years

The UWMP Act requires the City to quantify the minimum water supply available during the next three years based on the driest multiple year historical sequence for its water supplies. For the City, this includes SWP water, Permit Water and treated water from Vallejo, and recycled water.

Table 9-2 summarizes the results of this analysis for each source from the years 2006 through 2008. A detailed description of how the estimates were obtained for each source is summarized below.

Table 9-2
Estimated Normal Water Year Supplies for Next 3 Years (AFY)

Year	2006	2007	2008
SWP Supply ^a	3,297	3,351	3,406
Other Sources/Supplies ^a			
Vallejo Permit Water	500	500	500
Vallejo Treated Water	1,352	1,352	1,352
Vallejo Raw Water	500	500	500
City Recycled Water	180	625	772
Napa San Recycled Water	15	30	45
Total	5,844	6,358	6,575

^a See Table 4-2 for estimated normal water year supplies. Supply amounts for 2006 to 2008 are estimated by interpolating between the 2005 and 2010 amounts.

Table 9-3
Estimated Three-Year Minimum Water Supplies (AFY)

Year	2006	2007	2008
SWP Supply ^a	1,362	1,492	1,621
Other Sources/Supplies ^a			
Vallejo Permit Water	450	450	450
Vallejo Treated Water	1,217	1,217	1,217
Vallejo Raw Water	450	450	450
City Recycled Water	180	625	772
Napa San Recycled Water	14	27	41 ¹⁰
Total	3,659	4,234	4,510
% of Normal Water Year Supply	62%	67%	69%

^a See Table 4-6 for estimated multiple dry year water supplies. Supply amounts for 2006 to 2008 are estimated by interpolating between the 2005 and 2010 amounts.

SWP Supply

SWP delivery reliability data from the draft 2005 SWP Delivery Reliability Report was used to determine the driest three-year historical sequence for the SWP supplies. This data was provided in DWR Notice 05-08, dated May 25, 2005. Because the SWP supply is the most vulnerable to water delivery curtailments, the delivery percentages for a minimum 3-year supply were based on the deliveries for a multiple dry year condition (see Table 4-6).

Vallejo Water

The City receives Permit Water and treated water from Vallejo. When its SWP supply is curtailed, it may also purchase emergency raw water. Vallejo has never experienced a curtailment of its Permit Water allocation, even under severe drought conditions. In addition, Vallejo's residents have never experienced a water restriction during drought conditions. Although Vallejo residents have not had water restrictions imposed, it is reasonable to assume that Vallejo would impose a reduction of up to 10% under drought conditions. This 10% reduction was used to determine the minimum water supply available from each Vallejo source during the next three years.

¹⁰ This numbers represent 90% of projected normal supply.

Recycled Water Supply

Since July 2005, the City has been operating a Water Reclamation Facility under the SFBRWQCB Order No. 00-003 and NPDES Permit No. CA 0038768. The City currently has a user agreement with Green Island Vineyards for an annual estimated delivery of 107 acre-feet. Water deliveries will be expanded to an estimated 858 AFY by the year 2008 as sections of the distribution systems are completed. In dry years, it is estimated that recycled water supplies would be reduced by 10%.

9.4 Water Shortages and Conservation Stages

Under normal year conditions, it is suggested that Stage 1, voluntary conservation, would be implemented. Doing this would be prudent because the SWP supply is vulnerable to climatic and hydrologic factors, and the City relies heavily on SWP water. Other stages may be implemented upon notice by the State of a projected water delivery curtailment for the water year. Stage 4 is the most severe conservation stage and may include drastic measures such as water rationing. Under dry year conditions, this stage may have to be implemented if the City is unable to secure other supplies that may become available as a result of the severe curtailment.¹¹

Prohibitions, Penalties, and Consumption Reduction Methods

The City is currently developing a water shortage contingency ordinance that will codify the prohibitions, consumption reduction methods and penalties that would take effect during a water shortage. A draft ordinance is included in Appendix H. The following sections outline the essential elements of the City's draft plan. Prohibitions are actions which the City prohibits due to their water-wasting nature, while consumption reduction methods are methods the City will use to encourage water savings. All prohibitions are also consumption reduction methods.

The draft ordinance includes water waste prohibitions which list various non-essential uses of potable water that are not allowed under any circumstances. These non-essential uses include, for example, washing of sidewalks and excessive irrigation run-off. A full listing is shown on Table 9-4.

The City Council, with technical advice from the Public Works Director, is the authorizing body that could declare a state of water shortage based on climatic or other conditions. A conservation stage is declared based on the severity of the water shortage.

A Stage 1 water shortage is declared when there is a need for a city-wide reduction in water consumption of 10%. Stage 1 includes voluntary water use prohibitions as listed in Table 9-4. Stage 2 is declared when a 20% reduction in water consumption is necessary. The prohibitions for Stage 2 are mandatory. Additionally, when Stage 2 is in effect, the voluntary prohibitions of Stage 1 continue to be effective. Stage 3 is declared when a 30% reduction in water consumption is necessary. Stage 3 prohibitions are mandatory and include the Stage 1 and Stage 2 prohibitions. Stage 4 is declared when a 50% reduction in water consumption is necessary. Stage 4 prohibitions are mandatory and include the Stage 1, 2, and 3 prohibitions.

¹¹ During the early 1990s, for example, water supplies in the area became available on a short-term basis from farmers who sold their SWP water supply.

Table 9-4
Water Conservation Stages and Non-Essential Uses of Water/Prohibitions

Stage	Compliance	Non-Essential Uses of Water/Water Waste Prohibitions	Water Reduction Goal
NA	Mandatory – Water Waste Prohibitions effective at all times	<ul style="list-style-type: none"> Excessive plumbing leaks not repaired Excessive irrigation run-off Washing cars without a shutoff valve on hose Water for non-recirculating decorative water fountains Water for single pass evaporative cooling systems Water for new non-recirculating industrial clothes wash systems Fire suppression systems are exempt. 	NA
1	Voluntary	<p><i>Activities requested:</i></p> <ul style="list-style-type: none"> Sweep sidewalks, driveways and other hard surfaces with a broom, rather than by spraying water Applying irrigation water during evening or early mornings only Inspection and repair of leaky irrigation systems Vary irrigation amount with weather conditions Reduce irrigation cycle when run-off occurs Utilize water conservation incentives and rebates to replace plumbing fixtures and appliances Utilize City information for water efficient landscaping. 	10%
2	Mandatory – Water Alert	<ul style="list-style-type: none"> Stage 1 activities continue to be in effect City street cleaning with potable water Refilling or initial filling of a swimming pool Non-commercial washing of privately-owned cars, boats Use of water from a fire hydrant except for fire fighting uses Use of potable water for dust control at construction sites Lawn watering will be allowed on only odd or on only even days of the month, at the discretion of the City Council and by direction of the Public Works Director. 	20%
3	Mandatory – Water Emergency	<ul style="list-style-type: none"> Stage 1 activities continue to be in effect Stage 2 non-essential uses in effect Planting of new landscaping and annuals Irrigation sprinkling; only hand held nozzle permitted. 	30%
4	Mandatory – Severe Water Emergency	<ul style="list-style-type: none"> Stage 1 activities continue to be in effect Stage 2 and Stage 3 non-essential uses in effect Mandatory water rationing in effect for all potable and raw water users. 	50%

Implementation and Enforcement of Water Conservation Stages

During conservation Stage 1, the method the City will use to accomplish the 10% water reduction in water use will be a public outreach effort. Information regarding the water shortage stage, the cause of the water shortage, and the voluntary prohibitions will be included in utility bill stuffers and in public notices placed at City Hall and in the local newspaper. These outreach efforts will be repeated and ongoing for the duration of the water shortage. The City will encourage residents to take advantage of water conservation programs available through the City, such as the toilet retrofit program.

During Stage 2, 3, and 4 water shortages, all Stage 1 voluntary prohibitions will continue to be in effect. Public outreach will be implemented during Stages 1 and 2. During Stages 3 and 4, in addition to public outreach, City Public Works staff will conduct “drive-by inspections” for evidence of violations in the course of their regular duties. Door hangers will be placed on the

doors of homes or businesses where violations are observed informing the water customer of the water use prohibitions and specifically which were violated.

Persons or businesses that do not correct or desist from committing the violations within a specific amount of time will be subject to enforcement in accordance with the City's ordinance.

Some of the possible actions the City may take are:

- Personal contact with the customer at the address of the water service to inform the customer of the violation.
- Written notice of the violation including a date that the violation is to be corrected may be left on the premises, with a copy of the notice sent by certified mail to the customer.
- Installation of a flow-restricting device on the service.
- Charging a water waste fee to the customer.

Penalties and Charges

The penalties and charges that are described in this UWMP are based on the draft ordinance that will be presented to City Council for consideration of adoption at a future date. These penalties and charges are examples of what can be included in the various water conservation stages to accomplish the water reduction goals contemplated with each stage.

Table 9-5
Penalties and Charges during Conservation Stages

Stage	Compliance	Penalties and Charges	Water Reduction Goal
NA	Mandatory – Water Waste Prohibitions effective at all times	<ul style="list-style-type: none"> • Written notice(s) of violation • Personal contact, if necessary • Violation, if uncorrected, is deemed an infraction • Exceptions for use of water may be granted by City Manager. 	NA
1	Voluntary	<ul style="list-style-type: none"> • None. Public outreach only. 	10%
2	Mandatory – Water Alert	<ul style="list-style-type: none"> • Written notice(s) of violation • Personal contact, if necessary • Violation, if uncorrected, is deemed an infraction • Exceptions for use of water may be granted by City Manager • Appeals for exceptions for use of water may be granted by City Council • Excess use penalty fees. 	20%
3	Mandatory – Water Emergency	<ul style="list-style-type: none"> • Written notice(s) of violation • Personal contact, if necessary • Violation, if uncorrected, is deemed an infraction • Exceptions for use of water may be granted by City Manager • Appeals for exceptions for use of water may be granted by City Council • Excess use penalty fees. 	30%
4	Mandatory – Severe Water Emergency	<ul style="list-style-type: none"> • Written notice(s) of violation • Personal contact, if necessary • Violation, if uncorrected, is deemed an infraction • Exceptions for use of water may be granted by City Manager • Appeals for exceptions for use of water may be granted by City Council • Excess use penalty fees • Temporary tiered rates during duration of drought • Water restricting device may be installed. 	50%

Additional Considerations

During a water shortage due to drought, the City will consider offering to purchase agricultural users' water for the duration of the drought.

Analysis of Revenue Impacts of Reduced Sales during Shortages

With each water shortage stage, successful water consumption reductions equate to a reduction in revenue due to a reduction in water sales. Although some expenses may be reduced due to a reduction in water delivery, many of the water system's expenses will remain the same despite reductions in water deliveries. The City plans to conduct a water rate study in the near future and a more detailed analysis of revenues during drought conditions may be included in that study. This UWMP provides a limited analysis in order to provide a general understanding of what is needed in terms of providing revenues and resources during drought conditions.

The City's water rates vary for commercial versus residential customers. The commercial customers' rates consist of two components: a fixed charge and a volume charge (i.e., the charge based on the amount of water used). Residential customers' rates consist of only a volume charge. Drought conditions will result in reduced revenues, unless the City adopts other charges such as temporary tiered rates during drought to help bolster the water fund during these periods

of time. Alternatively, the City may consider adopting an ongoing water conservation set-aside fee that stays in cash reserves to help support the water fund during drought conditions.

Table 9-6 shows the current revenue for the City's water operations fund as well as three potential water sales reduction scenarios. In the event that sales are reduced due to reductions in water consumption, the volume charge portion of the water service revenues would be reduced. All other revenue sources are anticipated to remain approximately unchanged. Table 9-6 presents anticipated revenue due to reduced sales during the three water conservation stages. Stage 1 is not included in the table because it is presumed that there is adequate revenue to support voluntary conservation. In the future water rate study, the Stage 1, 10% reduction could become the "baseline" used for determining water rates.

Table 9-6
Water Service Revenues during Normal and Shortage Years¹²

Revenues	Normal	Stage 2 20% Reduction	Stage 3 30% Reduction	Stage 4 50% Reduction
Water Service Fees				
Volume Charge	\$ 3,427,900	\$ 2,742,400	\$ 2,399,600	\$ 1,714,000
Flat Charge	71,000	71,000	71,000	71,000
Interest Earnings	82,500	82,500	82,500	82,500
Other Water Revenues	58,500	58,500	58,500	58,500
Transfers In	<u>65,400</u>	<u>65,400</u>	<u>65,400</u>	<u>65,400</u>
Total	\$ 3,705,300	\$3,019,800	\$2,677,000	\$1,991,400

Because over 90% of the revenues received from customer service charges are derived from volume charges, a reduction in water use will substantially affect revenues. Table 9-7 below illustrates the effect that reduced sales may have on water revenues.

Table 9-7
Conservation Stages and Revenue Impacts

Stage	Revenue Reduction
1	--
2	18.5%
3	28%
4	46%

In order to understand the fiscal condition of the Water Operations fund during a drought, it is necessary to include an analysis of the estimated expenditures during a drought. The expenditures shown in Table 9-8 are for operations and maintenance (O&M) for the treatment plant and the water distribution system. The table shows the City's expenditures in 2004, with a few modifications. In 2004, the City purchased treated water from Napa because the City's water treatment plant expansion had not been completed. For purposes of this analysis, we are assuming that there will be no Napa water purchases and that the City's treatment plant can handle the water demands. Other assumptions are listed below:

¹² These numbers were developed based on a specific demand estimate. The demand estimate was later slightly revised. The revenues were not recalculated because these revenue figures are estimates only.

- Labor costs will remain at “normal” baseline levels even during shortage years.
- Materials, supplies, services and utilities will be reduced by 50% of the level of water use reductions (i.e., Stage 3 will cause these costs to be reduced by 15%).
- During “normal” baseline year, chemical purchases were modified from the actual 2004 expenditures to reflect the amount needed when the City’s treatment plant is fully operational.
- Chemicals will be reduced at the same level of water use reductions.
- Power costs will remain the same because the power to run the plant with lower water production levels is the same as at full production level.
- SWP water costs will not be reduced since the charge is a “fixed” charge that must be paid whether or not delivery is made.
- Vallejo treated water will be reduced to 90% at all stages since Vallejo water is not subject to higher reductions.
- During the “normal” baseline year, the City purchased 1,374 acre-feet of treated water from Napa. It is assumed that purchased water from Napa will no longer be needed because the City’s plant is fully operational and the SWP supply will be used.

Table 9-8
O&M Costs during Normal and Shortage Years

O&M Items	Normal	Stage 2 20% Reduction	Stage 3 30% Reduction	Stage 4 50% Reduction
Labor	\$ 658,800	\$ 658,800	\$ 658,800	\$ 658,800
Matls/Supplies/Svcs/Utilities	1,285,100	1,156,600	1,092,300	963,800
Chemicals	107,000	85,600	74,900	53,500
Water purchases:				
SWP/NBA Water	443,600	443,600	443,600	443,600
Vallejo Treated Water	35,400	31,800	31,800	31,800
Power	<u>75,000</u>	<u>75,000</u>	<u>75,000</u>	<u>75,000</u>
Total	\$2,604,900	\$2,451,400	\$2,376,400	\$2,226,500

Table 9-9 compares estimated revenues versus expenditures during shortage years. The comparison shows a positive balance until Stage 4. Note, however, that this analysis does not include future foreseeable costs related to debt payments for the City’s water treatment plant or any capital costs that may already be under contract at the time of the shortage. In addition, a general practice in the water industry is to have approximately 3 months of operating expenses in reserves for catastrophic emergencies. For American Canyon, that equals approximately \$800,000. This amount is not covered under any shortage condition analyzed.

Table 9-9
Revenues vs. Expenditures during Shortage Years

	Stage 2 20% Reduction	Stage 3 30% Reduction	Stage 4 50% Reduction
Revenues	\$3,019,800	\$2,677,000	\$1,991,400
Expenditures	\$2,451,400	\$2,376,400	\$2,226,500
Overage or (Shortfall)	\$568,400	\$300,600	(\$235,100)

Water Use Monitoring Mechanisms

During a drought, water consumption reduction would be monitored City-wide by tracking water use through monthly meter readings and weekly production tracking. Annual water system audits may be conducted in drought years to identify water leaks.

Should the monitoring mechanisms indicate that the water conservation goals of the water shortage stage are not being met, public outreach efforts, and increased monitoring for water prohibition violations could be increased.

9.5 Catastrophic Supply Interruption Plan

The UWMP requires each supplier to create a Catastrophic Supply Interruption Plan (CSIP) to ensure readiness for response to emergencies in the water system. Last year the City completed a Water System Emergency Response Plan (ERP) in accordance with the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. The ERP was created for events caused by human intervention including, terrorist attacks and natural disasters. The ERP is used here to assist in complying with the UWMP act requirements for the CSIP. The City's ERP identifies the City's standardized response and recovery protocols to prevent, minimize, and mitigate injury and damage resulting from emergencies or natural disasters. The goals of the ERP include:

- Rapidly restoring water service after an emergency;
- Ensuring adequate water supply for fire suppression;
- Minimizing water system damage;
- Minimizing impact and loss to customers;
- Minimizing negative impacts on public health and employee safety; and
- Providing emergency public information concerning customer service.

The ERP includes emergency planning and water system information, including mutual aid agreements, emergency resources, emergency water supply calculations, and information on alternate water supplies. The ERP also contains emergency response chain-of-command information, concepts of operation, notification procedures, water quality sampling procedures, emergency response training, and action plans.

Although these documents provide the response procedures that the City will employ should such disasters be realized, they are not included in their entirety in this UWMP due to the confidential nature of the information they contain. However, a brief discussion of the plans is provided below, and based on an August 30, 2005 telephone conversation with DWR Central District employee Kim E. Rosmaier, such a summary is anticipated to be sufficient for the purposes of this section of the UWMP.

Disaster Events or Scenarios

The City's ERP contains specific action plans that have been developed to address major events that could cause a catastrophic interruption of the City's water supply. The threats considered include:

- Earthquake
- Floods
- Winter Storm
- Power Outage
- Contamination to Water System
- Structural Damage from Explosive Device
- Vandalism
- SCADA System Intrusion
- IT System Intrusion
- Chemical Release
- Water Supply Interruption
- Bomb Threat

In regard to natural disasters, the City is most vulnerable to an earthquake. The City is located in a seismically active zone, and the NBA is located less than half of a mile from the West Napa Fault Zone. A seismic event of sufficient magnitude could cause numerous breaks in the water distribution system. The overall extent of damage to the water system would be dependent on the magnitude, proximity, and associated acceleration of the seismic event.

The City has adequate capabilities to respond to emergencies associated with minor damage and common malfunctions of the water system. An adequate supply of spare parts is stocked and readily available. However, the degree of damage capable from seismic activity and other major events could make stocking adequate spare parts and other supplies impractical for City employees and on-site resources. As a result, recovery time would be dependent upon response time of off-site suppliers and contractors.

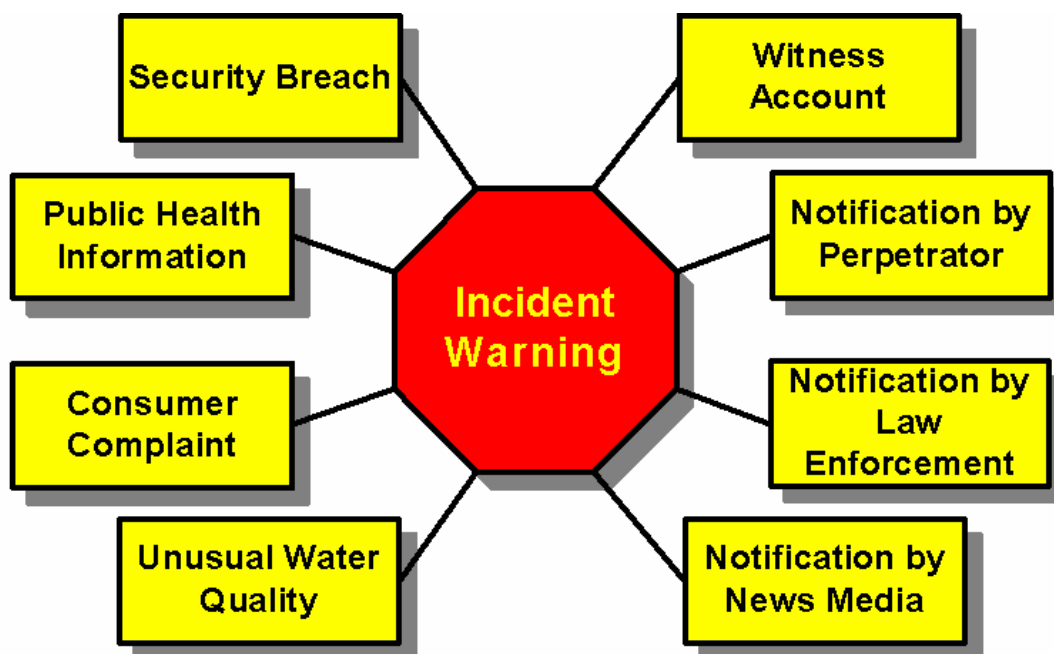
If a regional power outage were to occur, the City could continue to supply water to its customers, but at a reduced rate. The NBA provides gravity flow from a 7-million gallon concrete reservoir to the American Canyon treatment plant. There is a permanent emergency generator that operates the conventional treatment plant to ensure that the conventional plant and SCADA would remain operational. The City also has connections to hook up portable emergency generators at booster pump stations.

In regard to potential terrorist events, the City has evaluated the existing security measures in place at each component of the water system. Based on the evaluation, the City has identified actions that can be undertaken to decrease the vulnerability of the system.

Some of the important information described in the ERP and relevant to this UWMP are presented and discussed below.

Concept of Operations

A “threat warning” is the initial occurrence or discovery that triggers an evaluation of whether or not to activate the ERP. A summary of the possible types of threat warnings that the City may encounter is provided in the diagram that follows. If any of these conditions are met, then a Threat Warning will be issued by the City Manager.



Once a threat warning is issued, the threat decision process begins. The Public Works Director or designated alternate is immediately notified since this person will be involved in this decision process. The threat decision process is considered in three successive stages: “possible,” “credible,” and “confirmed.” As the threat escalates through these three stages, the actions that might be considered also change. The following table describes the stages, actions that will be taken, and activation of the ERP.

Table 9-10
Concept of Operations

Decision Process Stage	Actions Taken	ERP Activation Level
Stage 1 Possible Threat	<ul style="list-style-type: none">• Evaluate available information• Determine if threat is possible.	<ul style="list-style-type: none">• Implement precautionary response actions.
Stage 2 Credible Threat	<ul style="list-style-type: none">• Determine that threat is credible by establishing corroborating information• Highly credible source• Health department/customer reports• Unusual monitoring results.	<ul style="list-style-type: none">• Activate portions of ERP• Initiate internal and external notifications• Issue public health advisories• Initiate water sampling and analysis• Consider partial or full activation of EOC.
Stage 3 Confirmed Major Event	<ul style="list-style-type: none">• Confirm threat by verifying definitive evidence and information that establishes the major event• Perform water sampling and analysis.	<ul style="list-style-type: none">• Fully implement ERP• Immediately initiate appropriate Action Plans• Fully activate EOC.

Section 10.0 Recycled Water Plan

10.1 Introduction

This section describes the City's recycled water plan and the potential for the City to use recycled water as a water supply source in the City's service area. Because the City owns and operates its own WWTP and also owns and operates its own water treatment plant, this recycled water plan was not developed with other agencies.

All of the wastewater received at the City's WWTP undergoes tertiary treatment, making it suitable for recycled water uses, such as irrigation and industrial uses. The treated wastewater is currently discharged to the North Slough and to a constructed wetland, with the exception of the recycled water delivered to the City's one recycled water customer, Green Island Vineyards.

Very little of the treated wastewater is currently used to offset potable water because the recycled water distribution system is still under construction. Significant portions of the recycled water distribution system have already been constructed in conjunction with recent construction of new development, particularly east of Highway 29. It is anticipated that the construction of the recycled water system will be completed by the end of 2008.

10.2 Existing Facilities

The City's WWTP was designed to produce high quality effluent that meets the State of California Title 22 requirements for reclaimed water (i.e., *recycled* water).

Collection System

Wastewater from the City is currently collected and conveyed to the WWTP via four pump stations. Pump Station E has a capacity of 4,280 gpm and pumps primarily domestic wastewater collected from the southern end of the City. The Tower Road Pump Station has a capacity of 950 gpm and pumps industrial wastewater collected primarily from the north end of the City. The Green Island Road Pump Station has a capacity of 800 gpm and pumps industrial wastewater originating in the vicinity of Green Island Road. A fourth small lift station is located at the Solid Waste Transfer Station near Tower Road.

The WWTP is located northwest of the western end of Eucalyptus Drive near the Napa River. There are two force mains delivering wastewater to the plant. One of the force mains comes from Pump Station E at the southern end of the City (Main Basin). It is estimated that approximately 75% of the total wastewater flow from the City is pumped from Pump Station E into the southern force main and is primarily domestic. The Tower Road Pump Station, the Green Island Pump Station, and the Transfer Station Pump Station deliver wastewater to the WWTP in a second force main coming from the north end of the City (North Basin). This second force main contains a combination of industrial and domestic wastewater.

Quantification of the amount of actual wastewater collected and treated in acre-feet per year is summarized in Table 10-1 for 2000 and 2005 (based on 2004). This table also estimates

projected wastewater collection and treatment by applying water consumption increases between 5-year increments.

Table 10-1
Wastewater Collected and Treated – Actual and Projected (AFY)

Year	2000	2005 ^b	2010 ^c	2015	2020	2025
Wastewater collected and treated in service area ^a	1,135	1,508	2,141	2,612	2,678	2,745

^a All wastewater undergoes tertiary treatment and meets Title 22 standards.

^b Amount of wastewater collected and treated in 2005 is based on actual amount from 2004.

^c Estimates are derived from comparing projected population growth and applying per capita wastewater generation figures.

Wastewater Treatment

The wastewater collected from the North Basin has a much higher salinity level than that collected from the Main Basin due to industrial users. A key component of the City's approach to treatment is to treat the North Basin flow separately from the Main Basin flow.

The WWTP utilizes an aerated process with an immersed membrane bioreactor (MBR) system that produces a very high quality effluent exceeding the standards set by the discharge permit. The WWTP was designed to treat a build-out flow rate of 2.5 million gallons per day (mgd) at average dry weather flow (ADWF) conditions, and 5.0 mgd at peak wet weather flow conditions. The WWTP process train includes an emergency overflow basin, headworks facilities, anoxic basins, aeration tanks with membrane facilities, chemical storage and metering facilities, disinfection facilities, a recycled water pump station, a blower building, and an operations building.

Wastewater Disposal Methods

The City currently operates its WWTP under SFBRWQCB Order No. 00-003 and NPDES Permit No. CA 0038768. The permit covers the City's discharge to both North Slough and a constructed wetland that eventually flows to North Slough. Recycled water for potable offset will be provided from the Main Basin Flow.

The NPDES permit provides both maximum and minimum discharge limits to the constructed wetland. The maximum limit is 1.0 mgd. Discharge in the minimum amount necessary to maintain the wetland is required. The minimum amount of water required was determined to be the amount lost to evaporation, as little percolation occurs due to the low permeability of the underlying soils. With an approximate surface area of 132,000 square feet, a minimum of 0.02 mgd was determined to be required for an average July.

10.3 Recycled Water Use

The City received a recycled water planning grant from the California State Water Resources Control Board (SWRCB) and completed a Recycled Water Facilities Plan (Facilities Plan) in 2003 that established a planning-level system layout, and budget for distribution piping, pumping and storage facilities. On November 20, 2003, the City Council formally adopted Resolution 2003-45 accepting the Facilities Plan and certifying the associated environmental document. This same Council Resolution included several new recycled water system policy guidelines that modified the Facilities Plan recommendations. These guidelines resulted in a new

document entitled the *Recycled Water Implementation Plan*. The final draft of the Recycled Water Implementation Plan was completed on September 22, 2005 (Appendix J).

The City's Recycled Water Implementation Plan includes a phased system expansion approach. It is anticipated that the distribution system construction, including storage tanks and a storage pond, will be completed by the end of 2008.

Existing Recycled Water Use

In 2005, the City entered into an agreement with its first recycled water customer, Green Island Vineyards. As a prerequisite to deliver recycled water to Green Island Vineyards, the City developed a Technical Report and Notice of Intent to comply with the SFBRWQCB Order 96-011 (the General Water Reuse Permit for the San Francisco Bay Region). The Technical Report outlines the major procedures required by the City's new recycled water utility.

The SFBRWQCB accepted and approved the City's Technical Report and Notice of Intent thereby granting the necessary city-wide General Water Reuse Permit allowing customer hook-ups for the entire recycled water system expansion. Green Island Vineyard is expected to utilize 107 acre-feet of recycled water per year, primarily in the months of April through October. Recycled water deliveries to Green Island Vineyard began in July 2005.

Projected Recycled Water Use

Of the three alternatives presented in the Facilities Plan, Alternative No. 1 was the recommended approach because it would supply the greatest quantity of recycled water to revenue-generating customers, and would result in the lowest unit cost. Alternative No. 1 consists of delivering recycled water to all customers identified in the market assessment, as well as discharge to a spray field, and continued discharge to the constructed wetland.

As part of the development of the Recycled Water Implementation Plan, a value engineering review of the proposed customer distribution system was performed. As a result of the review, portions of the pipeline were realigned, with the final system layout including expansion of recycled water to a total of 53 new customers by 2008. Table 10-2 summarizes the projected use of recycled water for each customer category. For the purposes of this UWMP, Table 10-2 includes only recycled water users that would offset potable water use.

Table 10-2
Projected Use of Recycled Water

Type of Use	Number of Users	Recycled Water Use ^a			
		2010	2015	2020	2025
Irrigation					
Vineyards	9	481	481	481	481
Schools	4	58	58	58	58
Parks	14	135	135	135	135
Streetscapes	16	88	88	88	88
Commercial	6	68	68	68	68
Industrial	4	28	28	28	28
Totals	53	858	858	858	858

^a The estimated number of customers and projected demands listed in this table were taken from the Recycled Water Implementation Plan, dated September 22, 2005.

10.4 Encouraging Recycled Water Use

The City's Recycled Water Implementation Plan presents a recommended rate structure that covers O&M costs while still offering customers a price advantage for using recycled water. The rates for recycled water recommended in the Recycled Water Implementation Plan are lower than the rates for potable water for the City's targeted customers. The Recycled Water Implementation Plan proposes a recycled water rate of 50% of the City's established potable water rate for landscape and industrial use, and 75% of the raw water rate for vineyards.

In addition to financial incentives, the City will be performing periodic reviews and updates of their recycled water marketing and public outreach activities. The City will be looking at other successful recycled water marketing and outreach programs for possible improvements to its own program.

As needed, the City will organize and conduct community workshops, meetings and presentations on recycled water with future customers, homeowner associations, schools and neighborhood groups. The City will quickly evaluate any public concerns or questions regarding recycled water use permitting, health issues, additional environmental mitigation activities and ongoing construction impacts with recommended responses and/or actions.

The City will also update, as needed, their recycled water outreach communications materials. Such communications materials may include postcards for special announcements, newsletters, brochures, give-away items, news media kits, and press releases.

10.5 Recycled Water From Napa Sanitation District

As discussed in Section 4.2 of this report, the Napa Sanitation District (District) to the north has its own recycled water program and plans to supply recycled water to the Napa County Airport industrial area, which falls within the City's potable water service area. According to the District's final draft of their Strategic Plan for Recycled Water Use in the Year 2020 (Strategic Plan), dated August 2005, the District plans to have recycled water available to this area for landscape irrigation by 2006 and maximum usage occurring by 2020 (see Strategy No. 3, Phase 1).

The area within the City's potable water service area that will receive recycled water offsets from Napa Sanitation District is shown in Figure 4-2. The Figure was developed using Figure ES-3 from the District's Strategic Plan. Applying an average landscape irrigation demand rate of 0.28 AFY per gross acre, which is consistent with the District's Strategic Plan, the total potential recycled water offset from the District is 226 AFY. It is assumed that this offset will occur at a constant growth rate between 2006 and 2020.